AIR FORCE

QUALIFICATION TRAINING PACKAGE (AFQTP)

For

ELECTRICAL SYSTEMS
(3E0X1)

MODULE 26

AIR FORCE SPECIALTY (AFS)

SPECIFIC CONTINGENCY RESPONSIBILITIES

TABLE OF CONTENTS

MODULE 26

AFSC SPECIFIC CONTINGENCY RESPONSIBILITIES

Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES
for
ELECTRICAL SYSTEMS
(3E0X1)

INTRODUCTION

Before starting this AFQTP, refer to and read the "Trainee/Trainer Guide" located on the AFCESA Web site http://www.afcesa.af.mil/. This guide will be found at each AFS's AFQTP download page.

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification using the included Performance Checklist

Diamond task:

AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification using the included Performance Checklist when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Electrical Career Field Manager at the address below.

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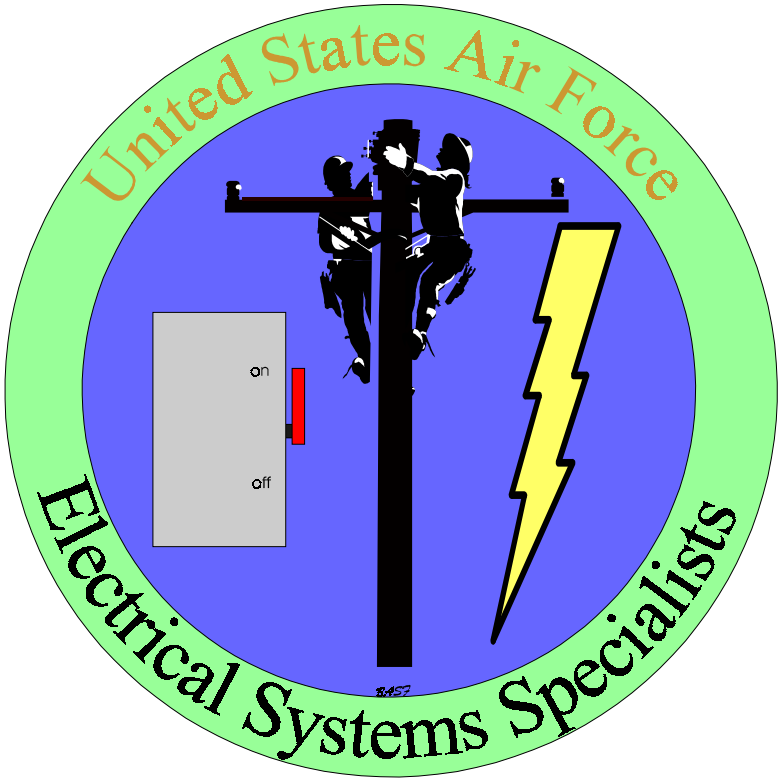
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.



AIRFIELD SUPPORT SYSTEMS

MODULE 26 **AFQTP UNIT 1**

EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)

Installation (26.1.1.2.1.)
Operation (26.1.1.2.2)
Maintenance (26.1.1.2.3)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATION
Task Training Guide

STS Reference Number/Title:	26.1.1.2.1, Installation 26.1.1.2.2, Operation 26.1.1.2.3, Maintenance
Training References:	• CD-ROM, Emergency Airfield Lighting System (EALS), Version 1.0, 3E0X1-26C.
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• EALS and associated equipment as identified in CD-ROM
Learning Objective:	• Given equipment, install, operate, and maintain an EALS.
Samples of Behavior:	• Follow approved methods to install, operate, and maintain an EALS.
Notes:	
Any safety violation is an automatic failure.	

EMERGENCY AIRFIELD LIGHTING SYSTEMS (EALS)

To accomplish this lesson, complete: **AFQTP, CD-ROM, 3E0X1-26C Emergency Airfield Lighting Systems (EALS) version 1.0.**

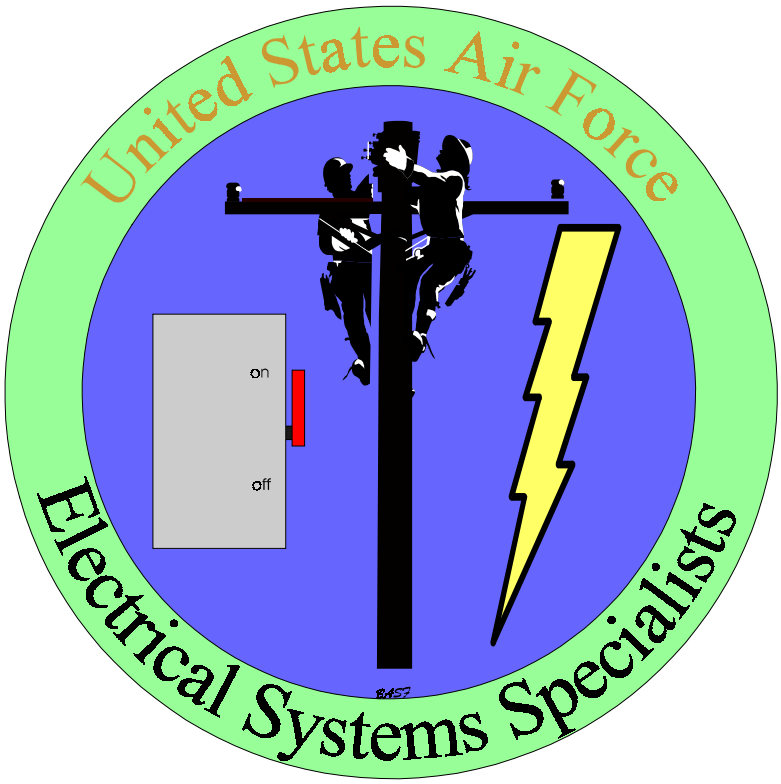
NOTE: In the CD-ROM there are tests after each lesson. After completion of each lesson, see your Unit Education and Training Manager to take the following **mandatory** Certests:

Test no	**Title**
8028	**EALS, Lesson One**
8029	**EALS, Lesson Two**
8030	**EALS, Lesson Three**
8031	**EALS, Lesson Four**
8032	**EALS, Lesson Five**

EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee perform all installation procedures correctly?		
2. Did trainee perform all operation procedures correctly?		
3. Did trainee perform all maintenance procedures correctly?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



FACILITY REPAIR

MODULE 26 **AFQTP UNIT 1**

ELECTRICAL SYSTEMS: EXPEDIENT REPAIR AND CANNIBALIZATION TECHNIQUES (26.1.2.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

ELECTRICAL SYSTEMS EXPEDIENT REPAIR AND CANNIBALIZATION TECHNIQUES

Task Training Guide

STS Reference Number/Title:	26.1.2.2., Electrical systems expedient repair and cannibalization techniques
Training References:	• AFPAM 10-219 Volume 3 (draft) • Post attack and post disaster procedures • CDC 3E051B Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electricians hand tools • High voltage gloves (high voltage certified personnel) • Hotline tools (high voltage certified personnel)
Learning Objective:	• The trainee will be able to identify expedient repair techniques deemed adequate to remedy the damage caused by natural disaster or hostile attack.
Samples of Behavior:	• Trainee will know what materials can be used for expedient repairs and where to locate them.
Notes:	
• Trainee will be able to identify expedient repair techniques caused by natural disaster or hostile attack. • Trainee will know what materials can be used for expedient repairs and where to locate them. • Any major discrepancies or safety violation constitutes failure.	

ELECTRICAL SYSTEMS EXPEDIENT REPAIR AND CANNIBALIZATION TECHNIQUES

Background: Since time is normally a limiting factor in repairs made during expedient Air Base recovery, rapid completion of the job is more important than economy of labor, materials, and equipment. In making improvised repairs, any suitable material or equipment available is used to meet immediate needs. Expedient repairs are improved as time and supplies permit.

To perform the task, follow these steps:

Step 1: Cannibalization.

- Systems having identical or similar components may be restored by robbing parts from other damaged units to repair them.
- Primary and secondary circuits are the two major subsystems that electrical systems can be divided into.
- Circuits above 600 volts are generally referred to as primary or feeder circuits.
- Circuits carrying less than 600 volts are usually referred to as low voltage or secondary circuits.
- Even in a contingency situation, work on the high voltage primary systems will be performed only by craftsmen with specialized qualifications and equipment.

NOTE:
Detailed safety procedures for electrical repair operations are contained in AFI 32-1064, Electrical Safety Practices.

- The high voltages associated with an electrical system make it especially important to observe proper safety rules during repair activities.
- The two basic safety rules applied in any repair involving electrical systems are:

- **CONSIDER ALL ELECTRICAL EQUIPMENT IS ENERGIZED UNTIL POSITIVELY KNOWN THAT IS NOT.**
- **ONLY PERSONNEL CERTIFIED FOR THAT VOLTAGE SHOULD DO WORK ON ENERGIZED LINES AND EQUIPMENT.**

Step 2: The power distribution system.

- May consist of overhead power lines, underground power lines, or a combination of the two.
- Overhead power lines and the associated utility poles are likely to suffer extensive damage during a hurricane, tornado, or hostile attack.
- An underground system, although better protected from the high winds common to hurricanes and tornadoes, is still vulnerable to the effects of an earthquake, flooding or enemy munitions.

- The first action is the isolation of those damaged areas presenting life-threatening hazards to personnel or poses the potential for additional property damage.
- Once initial isolation is accomplished, DCC (Disaster Control Center) personnel, using base utility plans and maps, determine how the system can be rerouted to bypass damaged areas in order to restore electrical power to vital base facilities.
- After damage assessment data has been posted, the DCC should be able to quickly direct electrical system rerouting using the existing, undamaged circuits.
- However, there may still be areas where it is not possible to supply power to critical facilities using existing wiring.
  - In those instances, try cutting the damaged line on both sides of the destruction and bridging the area with a new cable. If it does not pose a danger, run the new power line directly along the surface.
  - Otherwise, erect temporary power poles by using pieces of damaged poles, available structural members, or raw timbers.
  - When rerouting around damaged areas remember that non-standard materials can be used provided they do not jeopardize safety. If capable of carrying the required loads, wires and cables of different sizes, or normally designed for other uses, may be substituted as expedient power lines.
  - Additionally, conductors, wire, and other components may be salvaged from unimportant or damaged facilities.

Step 3: Expedient repair of transformers.

- Can be accomplished if the damage is not too extensive.
- Cracks or holes in the tanks of the transformers can be patched by welding, provided testing indicates that internal parts have not been damaged.
- Transformers can be returned to service after being thoroughly dried and replacing lost or contaminated transformer oil.

NOTE:
Oil from damaged transformers must be filtered before being reused, and motor oil is not a satisfactory substitute for transformer use (a transformer requires a highly refined mineral oil free from moisture or other impurities).

- If the coils of the transformer are damaged, repair is not feasible.
- The coils and core of a transformer may be tested by applying approximately one-fourth of the rated voltage to the low-tension coils, and observing the transformer for 15 minutes.
  - Abnormal heat, smoke, or noise indicates a fault.
- Generally, there will not be sufficient spare transformers available to provide a one-for-one replacement for damaged units.
- For example, you may not have a single-phase transformer with the capacity for the required load. In such cases it may be necessary to parallel two smaller transformers in order to supply the load.

This expedient solution will solve an immediate problem, but is not cost effective and should be replaced when the correct equipment becomes available.

- In a situation where three-phase power is needed, and one transformer out of the three is damaged, three-phase power can still be provided by making what are commonly called open-delta connections (See Figures, 1 and 2).

NOTE:
Most facilities utilize WYE electrical systems. When using an open-delta connection to feed these facilities, the circuit breaker panels will need rewiring to keep from damaging the eqipment in the facility.

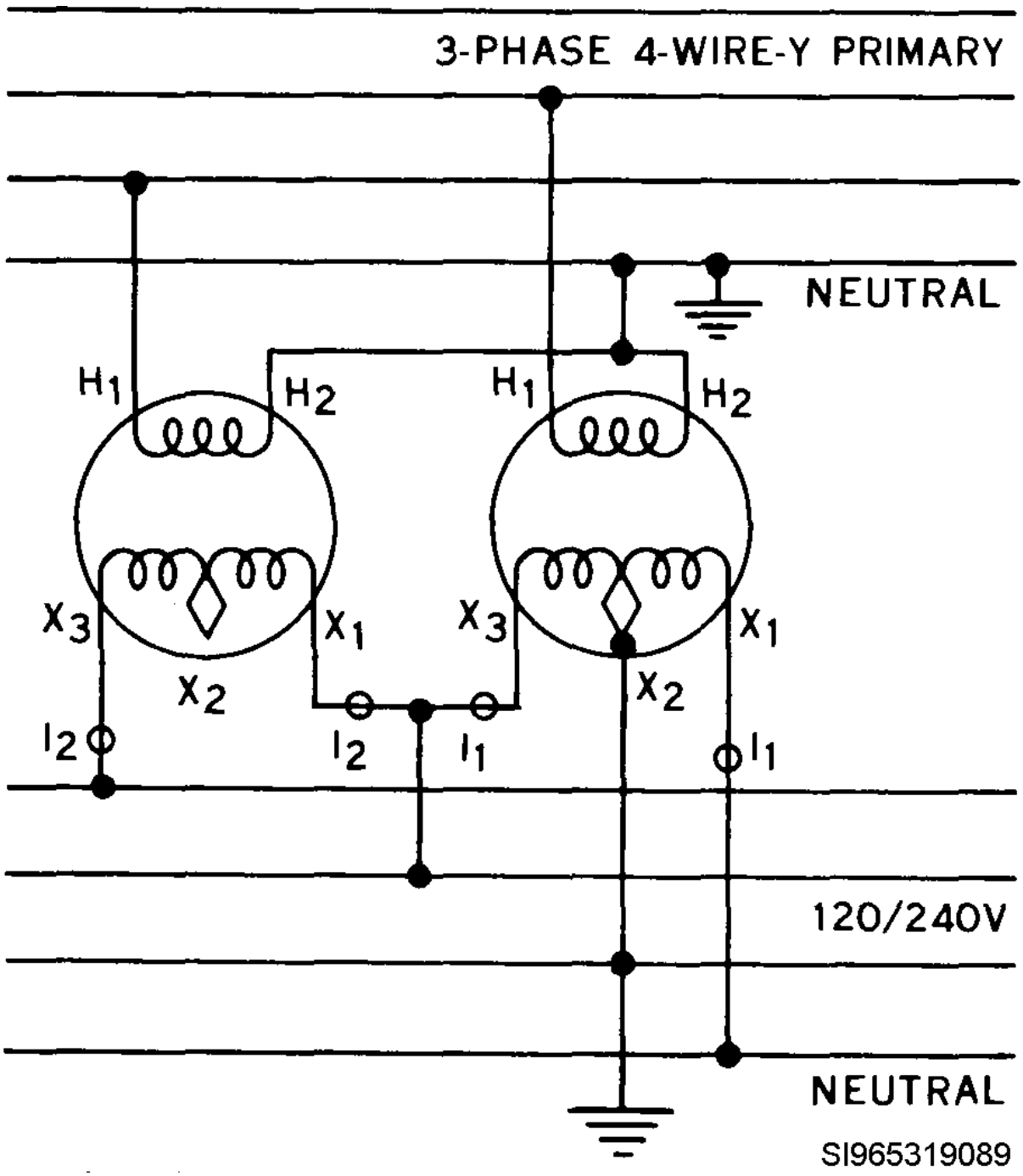


Figure 1, Three phase four wire, three phase wye.
The open-delta connection when a four-wire, three-phase wye primary is involved.

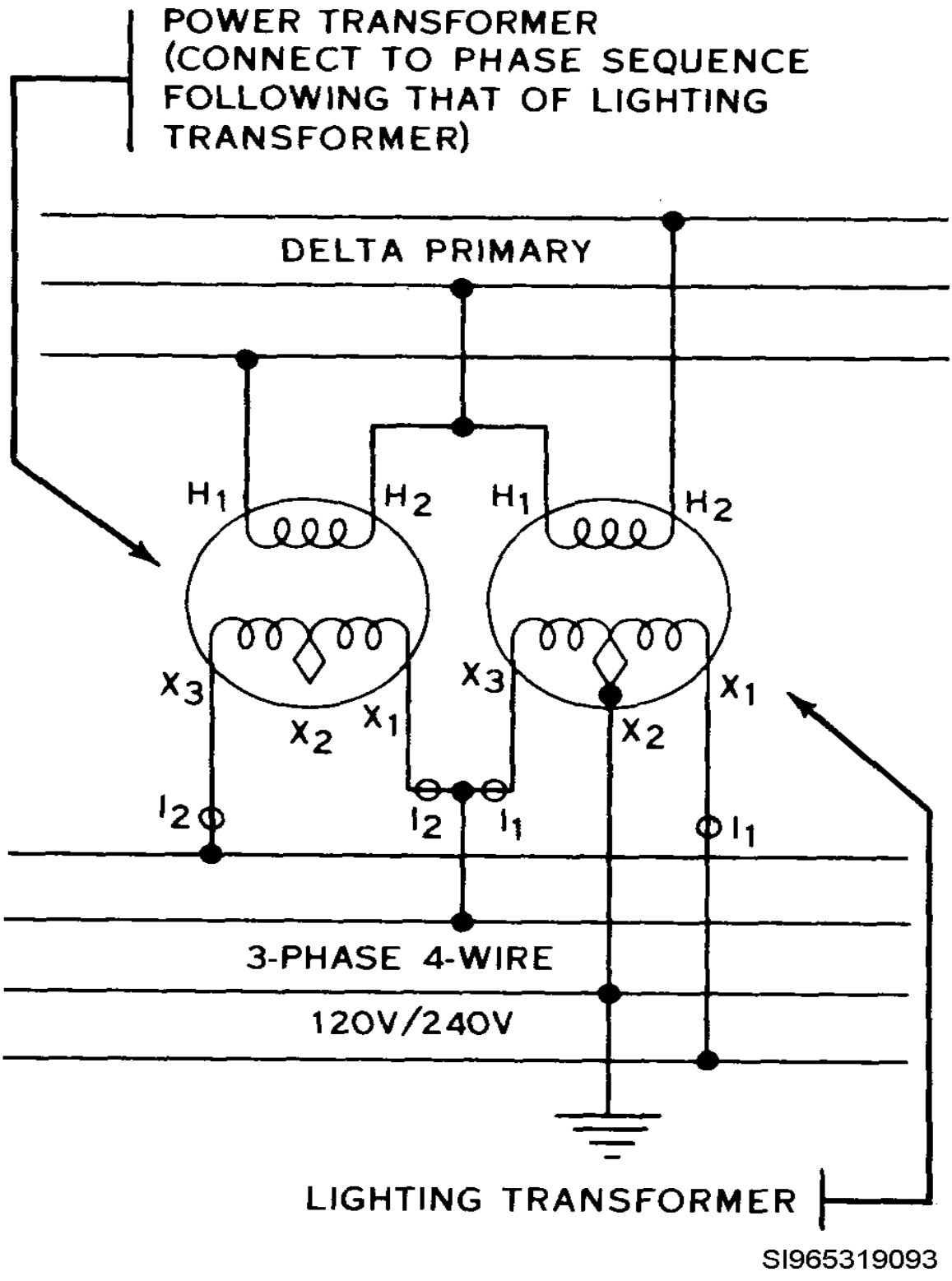


Figure 2, Lighting Transformer.
The open-delta connection when a three-wire, three-phase delta primary is involved.

- Regardless of the type of primary involved, these connections are used only for emergency situations and should not be constructed as permanent installations.
- The two transformers used in the open-delta connection will only supply 86.6 percent of their rated capacity.
- The total capacity of the bank will be only 57.7 percent of the original bank capacity.

Step 4: Expedient repairs to interior wiring.

- If the facility is not critical to current air base recovery operation, delay repairs until additional resources are available.
- For facilities considered essential to air base operations, determine the minimum level of electrical services needed.
- Ask yourself the following questions:
- Does an entire structure need power, or only a small portion of it?
- What type of equipment will the electrical system of the building be required to support?
- Will it only need minimum electrical voltage to provide lighting, or will there be requirements for specialized voltages to power large air conditioning units, refrigeration units, or X-ray machines?

HINT:

For example, there is no need to devote excessive manpower and materials to complete restoration of the base hospital's electrical system if the hospital staff needs only one section of the building and one X-ray machine. In this case, electrical wiring in this section of the building could be restored and a special high voltage cable could be run to operate the X-ray machine.

- In making expedient repairs to the interior wiring, use undamaged wiring to the maximum extent possible.
- This will cut repair time and result in fewer exposed live circuits when the facility is returned to operation.
- As in the distribution systems, damaged areas can be bypassed with new wiring to complete a vital circuit.
- In bypassing damaged areas or in running temporary lines into a structure, wiring can be run across floors and other building surfaces to expedite repairs.
- However, if the facility will be subject to a high volume of personnel traffic, it is better to tack the wiring to the wall or ceiling to prevent further damage or hazards to personnel.
- The temporary wiring does not have to be concealed to present a finished appearance; it only needs to be functional and out of the way of heavy traffic.
- Another important consideration in the expedient repair of interior electrical systems is the supply of wiring, switches, and associated hardware needed to make repairs.
- Depending on the extent of damage, base supply sources may not have adequate levels to provide for all repair needs.
- In these cases, cannibalization and substitution become very important.

- At theater locations, many components will be of foreign manufacture and not readily available through U.S. supply channels, making it imperative that repair crews salvage as much as possible.
- Structures declared irreparable may contain switches, wiring, and other hardware that can be used to restore electrical services to other structures.

NOTE:
Do not inflict additional or unnecessary damage during salvage attempts. Structures being cannibalized may have to be rehabilitated in the future.

- Expedient repairs are generally considered complete when major damage has been eliminated and most systems are capable of performing their basic function.
- Civil engineer forces now turn their efforts to a more permanent upgrade of these makeshift remedies and the organization of resources for the continuing operations and maintenance required to sustain the air base mission.

Review Questions
for
Electrical Systems Expedient Repair
and Cannibalization Techniques

Question	Answer
1. Cannibalization is a method used to restore identical, or similar systems, by robbing parts from some damaged units to repair others.	a. True b. False
2. The first action is the isolation of damaged areas that present life-threatening hazards to personnel, or poses the potential for additional property damage.	a. True b. False
3. The two basic safety rules that apply when working on any electrical system are?	a. Consider all electrical equipment energized. b. Work should be done only by personnel certified for that voltage. c. If it looks safe it usually is. d. Both a and b
4. Holes and cracks in transformer tanks can be repaired or patched by welding.	a. True b. False
5. The two transformers used in the open-delta connection will supply what percent of their rated capacity?	a. 57.7 b. 86.6 c. 93.3 d. 100
6. When making repairs to interior wiring, what is used to the maximum extent possible?	a. Undamaged wiring. b. Conduit. c. Circuit breakers. d. All of the above.
7. When are overhead power lines and associated utility poles likely to suffer extensive damage?	a. Hurricane. b. Tornado. c. Hostile attack. d. All of the above.
8. What type of oil does a transformer require?	a. Highly refined mineral oil. b. Motor oil. c. Synthetic oil. d. None of the above.
9. In bypassing damaged areas or in running temporary lines into a structure, wiring can be run across floors and other building surfaces to expedite repairs.	a. True b. False

Review Questions
for
Electrical Systems Expedient Repair
and Cannibalization Techniques

Questions	Answers
10. Expedient repairs are generally considered complete when major damage has been eliminated and most systems are capable of performing their basic function.	a. True b. False

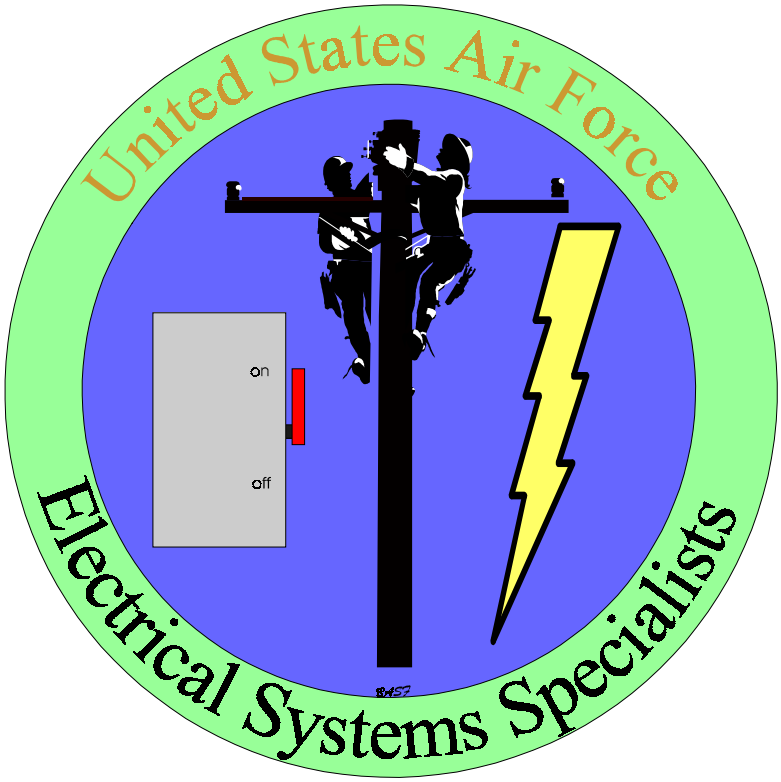
NOTE: After completion of this lesson, see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8118	**Elec. Sys. Expedient Repair, Cannibalization Tech.**

ELECTRICAL SYSTEMS EXPEDIENT REPAIR AND CANNIBALIZATION TECHNIQUES

Performance Checklist		
Step	**Yes**	**No**
1. Does the trainee know the meaning of expedient repairs?		
2. Does the trainee know the meaning of cannibalization?		
3. Does the trainee know the two basic safety rules?		
4. Does the trainee know what the first action is in damaged areas presenting life-threatening hazards or potential for additional damage?		
5. Does the trainee know who directs the electricians on how to reroute damaged areas in order to restore power to vital facilities?		
6. Does the trainee know what can be used as temporary power poles?		
7. Does the trainee know how to test the coil and core of a transformer for damage?		
8. Does the trainee know what power is available when transformers are connected open-delta?		
9. Does he or she know which buildings need immediate repair?		
Does he or she know the safe way to secure wiring in high traffic areas?		
10. Does the trainee know when to use cannibalization and substitution techniques?		
11. Does the trainee know when expedient repairs are generally considered complete?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST EAGLE ASSETS
TENT LIGHTING

MODULE 26 **AFQTP UNIT 2**

INSTALLATION (26.2.1.1.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

INSTALLATION
Task Training Guide

STS Reference Number/Title:	26.2.1.1.1., Installation
Training References:	• CDC 3E0X1B, Vol. 4. • TR: AFPAM 10-219,Vol. 5
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Harvest Eagle lighting kit • 8 foot ladder
Learning Objective:	• The trainee will know the steps required to safely install tent lighting for Harvest Eagle assets.
Samples of Behavior:	• Trainee will be able to name the parts that are required for Harvest Eagle tent lighting installation. • Trainee will know the required steps to perform the installation of Harvest Eagle tent lighting.

INSTALLATION

Background: The interior tent lighting and power distribution system consists of three major components: a distribution box, a convenience outlet assembly, and an incandescent light streamer assembly. The lightweight, molded distribution box has a single-pole toggle switch to control the lights and a 20-amp circuit breaker to protect both light and outlet circuits within the tent. Each tent receives two light streamers (three lights per streamer) and two convenience outlet assemblies (one assembly for each side of the tent).

To perform the task, follow these steps:

Step 1: Planning.

- For planning purposes, the dispersed distance used in this operational concept is 700 feet (550 feet from A-panel to B-panel and 150 feet from B-panel to each tent).
- The expected voltage drop for 550 feet of No. 6 AWG conductor (65 amperes, 95 percent power factor, and 75°F ambient temperature) is about 4.5 volts.
- If the generator is producing 120/208-V 3-phase power, there is approximately a 20.5-volt drop at the tent.
- To remedy this situation, increase the output voltage at the generator to approximately 130/225 volts. This provides a corresponding increase at each tent to 110 volts, which is totally acceptable.

Step 2: Tent lighting installation.

- The electrical system for each 550-person Harvest Eagle deployment supports eight separate modules, each of which is called a module group, as shown in figure 1.

Step 3: Module groups.

- The tents in each module group (there can be as many as 96 tents) receive their power from two 60-kW or four 30-kW generators, a total power capability in either case of 120 KW.
- Each generator is connected via a 200-amp Harvest Falcon secondary distribution cable to a secondary distribution panel, the A-panel. Each A-panel, in turn, provides power to four separate 20-kW secondary distribution panels, the B-panels.
- Each B-panel powers twelve 20-amp branch circuits for the tents.
- Each tent receives a lightweight distribution box to power 6 lights and 12 duplex outlets.
- The layout of Harvest Eagle tents provides the maximum dispersal of assets under the limitations and constraints of a low voltage system.
- If the deployment is to a low threat area where maximum dispersal is not required, spacing distances between tents and modules can be reduced accordingly.

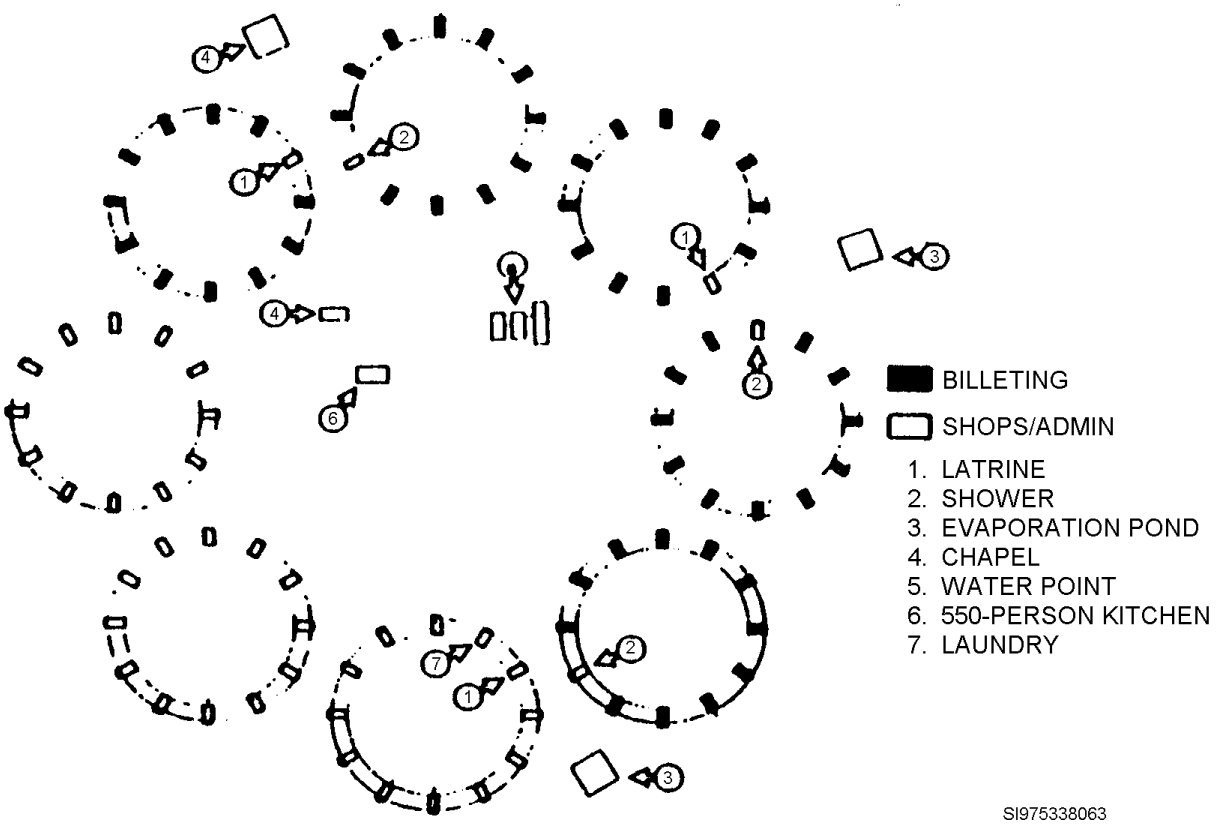


Figure 1, Module group layout-550 person bare base.

NOTE:
For dispersed conditions, however, secondary cables are simply plugged together much like household extension cords to gain the desired lengths.

- Total cable distances from the generator to the point of use should not exceed 800 feet.

Review Questions for Installation

Question	Answer
1. What is the total kw rating of the generators that supply power to a module group?	a. 100 kw b. 120 kw c. 150 kw d. 180 kw
2. Total cable distances from the generator to the point of use should not exceed what length?	a. 500 ft b. 600 ft c. 700 ft d. 800 ft
3. Increasing the voltage at the generator remedies the _____ at the tent.	a. Lighting loss b. Voltage increase c. Voltage drop d. Amperage drop
4. Which of the following IS NOT a major component of the tent lighting and power distribution?	a. Distribution box b. Convenience outlet assembly c. Two 60 kw generators d. Incandescent light streamer assembly

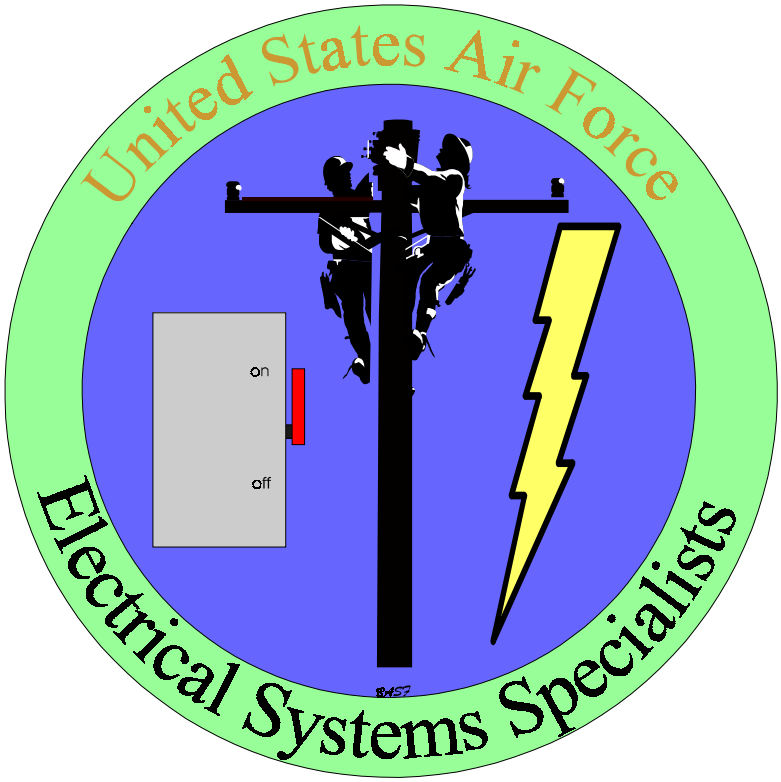
NOTE: After completion of **all** the lessons you may see your Unit Education and Training Manager to take the following optional Certest:

Test no.	**Title**
8120	**Harvest Eagle Tent Lighting Installation, Removal**

INSTALLATION

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee identify all the parts needed for the job?		
2. Does the trainee know how to assemble the lights?		
3. Does the trainee know the maximum total cable distances allowed from the generator to the tents?		
4. Does the trainee know how to rectify the problem of voltage drop?		
5. Does the trainee know the required components needed for each tent?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST EAGLE ASSETS
TENT LIGHTING

MODULE 26 **AFQTP UNIT 2**

REMOVAL (26.2.1.1.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

REMOVAL
Task Training Guide

STS Reference Number/Title:	26.2.1.1.2., Removal
Training References:	• 3E0X1B, Vol. 4 • AFPAM 10-219, Vol. 5
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• 8 foot ladder • Harvest Eagle Tent Lighting Set
Learning Objective:	• The trainee will know the steps required to safely remove Harvest Eagle Tent Lighting.
Samples of Behavior:	• Trainee will be able to name the parts that are required for tent lighting removal. • Trainee will know the required steps to perform the removal of tent lighting.

REMOVAL

Background: This lesson covers the removal of Harvest Eagle tent lighting.

Tent lighting removal.

- When the need for the power to the tents no longer exists, then obviously it is time to disassemble the lighting assets and store them away. Because of the ease of the assembly (plugging in cords), it is just as easy to disassemble. The design of the power kits is such that anyone may remove the kits once the primary power has been disconnected. It is very important that once all the components have been disconnected you make certain you put back all the cords and various components (panels, light fixtures, outlets, etc.) into their proper storage containers. This ensures that when the kit is needed again, all parts are accounted for and the system may be installed in a rapid manner as designed.

Review Questions for Removal

Question	Answer
1. What is the first step in removing tent lighting?	a. Remove fastening material. b. Remove fixtures. c. Remove cable. d. Disconnect power
2. What is the final step for tent light removal?	a. Roll up cable. b. Disconnect power. c. Replace all components to proper place. d. Remove fixtures

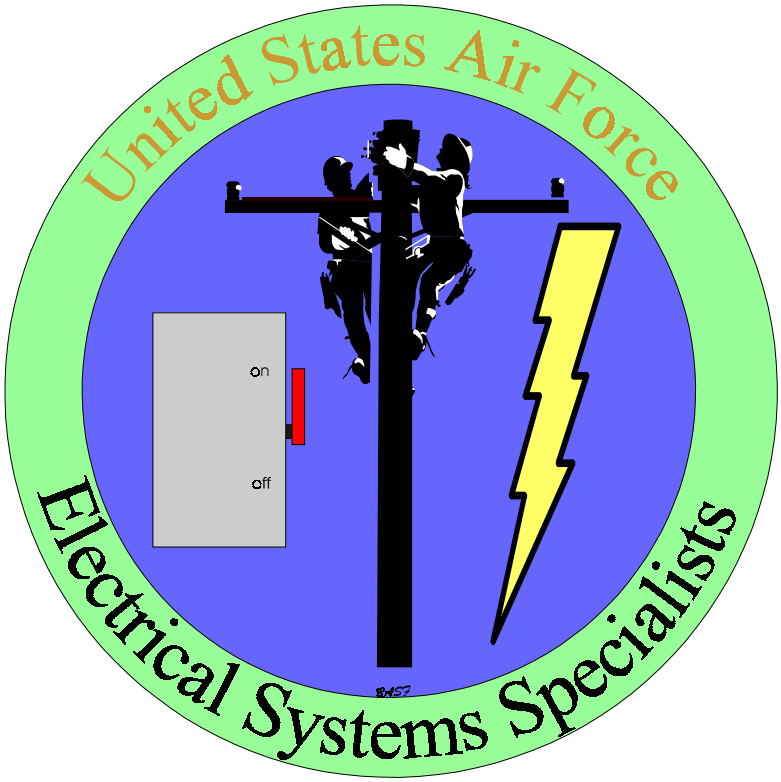
NOTE: After completion of **all** the lessons you may see your Unit Education and Training Manager to take the following optional Certest:

Test no.	**Title**
8120	**Harvest Eagle Tent Lighting Installation, Removal**

REMOVAL

Performance Checklist		
Step	**Yes**	**No**
1. Does trainee know why power is disconnected before removal of lights is started?		
2. Does trainee know how to check to see if power is removed from cable?		
3. Did trainee replace parts properly when completed with the removal of the lights?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST EAGLE ASSETS
ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

INSTALLATION (26.2.1.2.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Task Training Guide

STS Reference Number/Title:	26.2.1.2.1., Installation
Training References:	• CD-ROM, (3E0X1-26.2.1.2., Harvest Eagle Electrical Distribution System) • AFPAM 10-219 ,Vol. 5 • TO 00-105K-2 • TO 40W4-9-1C • TO 40W4-13-1 • TO 50D1-3-1 • TO 35E4-169-1 • CDC 3E051B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hand Tools
Learning Objective:	• Trainee will know the necessary steps to properly install Harvest Eagle Electrical System components.
Samples of Behavior:	• Trainee will be able to identify the various types of components to a (H.E.) Electrical Distribution System. • Trainee will know the required steps to install the various types of components.
Notes:	
• To successfully complete this element, the trainee must be able to identify proper procedures to install HE electrical distribution system components with no major discrepancies.	

INSTALLATION

Background: For most contingency situations, the electrical system to support force beddown operations is required immediately. The limitation of available time dictates the expedient methods used to complete the system. In setting up the electrical utility for a force beddown operation, adherence to certain construction principles ensures that effective use is made of available manpower and resources.

NOTE:
Harvest Eagle electrical distribution is different from Bare Base in that the Harvest Eagle Electrical Distribution is primarily used for deployments that are short term, and require primarily low voltage distribution.

To accomplish this lesson, complete: **CD-ROM 3E0X1-26.2.1.2., HARVEST EAGLE Electrical Distribution System**

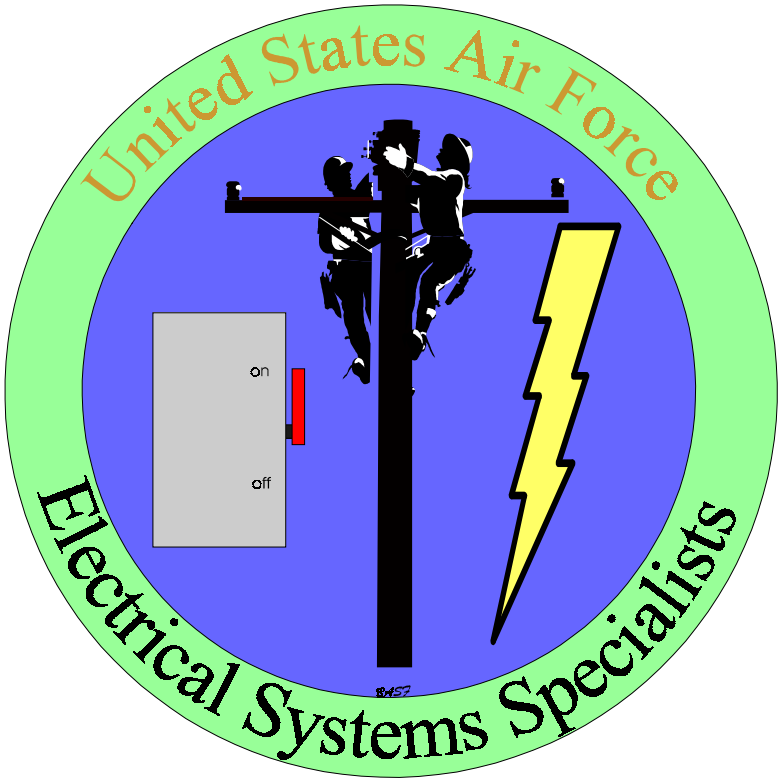
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8080	**Harvest Eagle Electrical Distribution System**

INSTALLATION

Performance Checklist		
Step	**Yes**	**No**
1. Does trainee know the types of generators in a Harvest Eagle electrical kit?		
2. Does trainee know importance of collecting data?		
3. Did trainee perform proper grounding requirements for MEP generators and panels?		
4. Does trainee comprehend Harvest Eagle cable sizes and applications?		
5. Does trainee know the recommended power source for force beddown operations?		
6. Can trainee identify the different types of layouts?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST EAGLE ASSETS
ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

OPERATION (26.2.1.2.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

OPERATION

Task Training Guide

STS Reference Number/Title:	26.2.1.2.2., Operation
Training References:	• CD-ROM, 3E0X1-26.2.1.2, (Harvest Eagle Electrical Distribution System) • AFPAM 10-219, Vol. 5 • TO 00-105K-2 • TO 40W4-9-1C • TO 40W4-13-1 • TO 50D1-3-1 • TO 35E4-169-1 • CDC 3E051B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hand Tools • Rubber Protective Equipment
Learning Objective:	• Trainee will know the necessary steps to properly operate Harvest Eagle Electrical System components.
Samples of Behavior:	• Trainee will be able to identify the various types of components to a (H.E.) Electrical Distribution System. • Trainee will know the required steps to operate the various types of components.
Notes:	
• To successfully complete this element, the trainee must be able to identify proper procedures to operate HE system components with no major discrepancies. • Any safety violation is an automatic failure.	

OPERATION

Background: The electrical distribution system is designed to accept 4,160-VAC, 3-phase, 60-Hz primary power from a generator or commercial power source and step the voltage down through transformers in the secondary distribution center (SDC). The SDC is the primary distribution point for the secondary circuits that power various loads such as airfield lighting, shelters, hangars, remote area lighting, and other systems requiring 120/208 VAC.

NOTE:
Since the equipment operates as conventional electrical circuitry, no additional theory is necessary to understand system operation.

***To accomplish this lesson, complete*: CD-ROM 3E0X1-26.2.1.2 HARVEST EAGLE Electrical Distribution System**

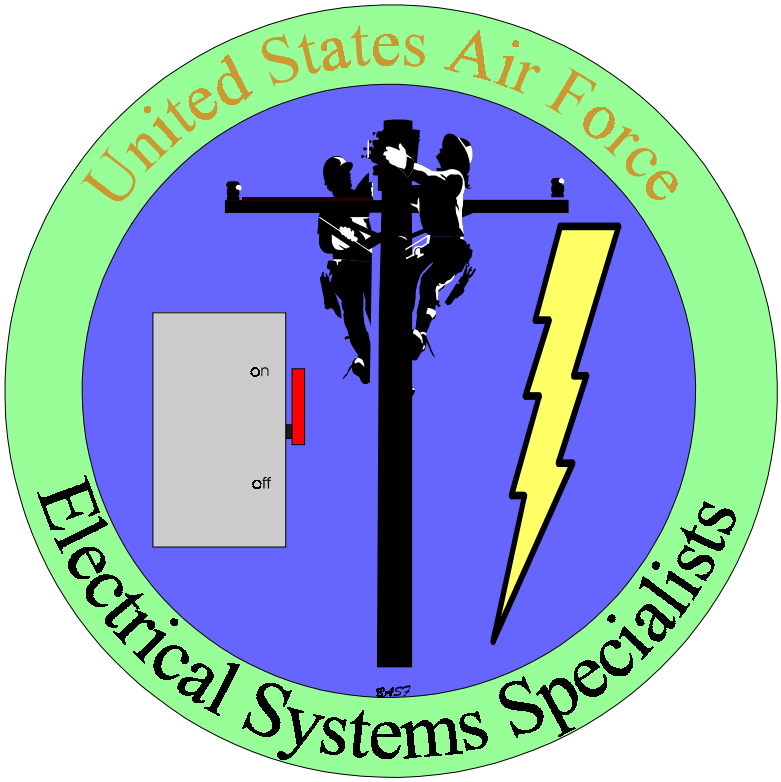
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8080	**Harvest Eagle Electrical Distribution System**

OPERATION

Performance Checklist		
Step	**Yes**	**No**
1. Does trainee understand the purpose of the Secondary Distribution Center (SDC)?		
2. Does trainee identify the capabilities of the SDC input/output, and number of circuits?		
3. Does trainee know the operation of the SDC?		
4. Were the proper safety practices followed?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST EAGLE ASSETS
ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

TROUBLESHOOTING (26.2.1.2.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

MAINTENANCE
Task Training Guide

STS Reference Number/Title:	26.2.1.2.3, Maintenance
Training References:	• CD-ROM, 3E0X1-26.2.1.2. (Harvest Eagle Electrical Distribution System) • AFPAM 10-219, Vol. 5 • TO 00-105K-2 • TO 40W4-9-1C • TO 40W4-13-1 • TO 50D1-3-1 • TO 35E4-169-1 • CDC 3E051B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hand Tools • Rubber Protective Equipment • Meters
Learning Objective:	• Trainee will know the necessary steps to properly maintain Harvest Eagle Electrical System components.
Samples of Behavior:	• Trainee will be able to identify the various types of components to a (H.E.) Electrical Distribution System • Trainee will know the required steps to maintain the various types of components.
Notes:	
• To successfully complete this element, the trainee must be able to identify proper procedures to maintain HE system components with no major discrepancies. • Any safety violation is an automatic failure.	

TROUBLESHOOTING

Background: In most situations, all that is needed for troubleshooting is a voltage tester and an ammeter. Once the entire system is operating properly, it is only a matter of time until you lose power to a certain area. This is when true troubleshooting comes into play.

***To accomplish this leson, complete*: CD-ROM, 3E0X1-26.2.1.2, HARVEST EAGLE Electrical Distribution System**

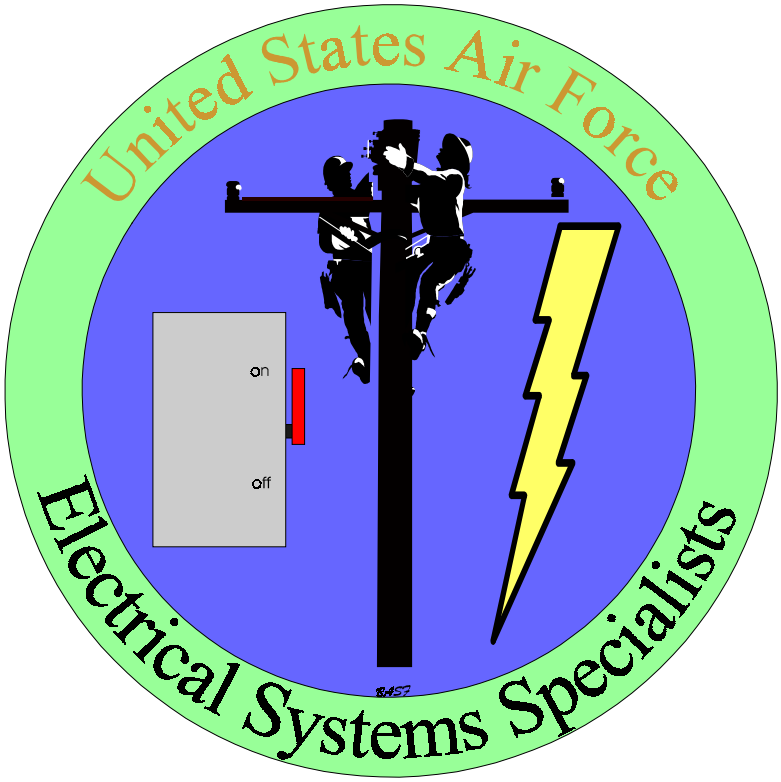
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8080	**Harvest Eagle Electrical Distribution System**

TROUBLESHOOTING

Performance Checklist		
Step	**Yes**	**No**
1. Does trainee have the proper tools for troubleshooting?		
2. Did trainee start by isolating the problem?		
3. Does trainee understand the proper steps to follow?		
4. Was power restored?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
REMOTE AREA LIGHTING (RAL) SETS

MODULE 26 **AFQTP UNIT 2**

INSTALLATION (26.2.2.1.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

INSTALLATION
Task Training Guide

STS Reference Number/Title:	26.2.2.1.1., Installation
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Falcon Electrical Distribution System • AFI 32-1064, Electrical Safe Practices • TO 00-105A-12
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Personal Protective Equipment/Clothing • Hand Tools • Multimeter • Work Gloves
Learning Objective:	• The trainee will know the steps required to safely install a Remote Area Lighting System.
Samples of Behavior:	• Trainee will be able to name the safety equipment required to install a Remote Area Lighting System. • Trainee will be able to install a Remote Area Lighting System.
Notes:	
• To successfully complete this element, the steps must be followed exactly—no exceptions. • Any safety violation is an automatic failure.	

INSTALLATION

Background: When you are deployed to a bare-base site, time is of the essence. Your team is required to get the base mission ready within 72 hours. In order to meet this deadline, your team has to work around the clock. You need a reliable lighting source that can illuminate the work areas during the hours of darkness. The remote area lighting system (RALS) meets this need. Not only does it provide all the light during base setup, but it can also be easily repositioned to meet other needs once the base is operational. Some of the other uses for the RALS are aircraft parking, munitions storage, and roadway lighting. In the event of actual setup, operation, and maintenance, refer to TO 00–105A–12, *Installation Operation and Maintenance instructions for the Remote Area Lighting System (RALS).* Each RALS unit (Figure, 1) is an air transportable cabinet that weighs approximately 2,500 pounds and contains everything needed to construct a 1,500-foot-long lighting system. The cabinet contains 250 feet of input cable, two 750-foot lighting cable assemblies, 13 light masts and associated bases, 13 fixtures, and 30 mercury vapor lamps. This system can be energized from any source that provides 120/208 VAC, 3-phase power.

To perform this task, follow these steps:

Step 1: RALS installation.

- Proper site selection is your first consideration when you install the unit. When you select this site, keep in mind the limitations of the lighting cables and the extent of the circuit.

NOTE:
While it is not critical that the RALS unit is perfectly level, the site should be as nearly level as possible for convenience.

- Clear the selected site of any brush or rocks that would make the unit unstable.
- The surface should also be firm and well drained to prevent the soil from washing out during heavy rains.
- Once the RALS cabinet is in place, you need to lay your cable.

Step 2: Cable.

- There are three sections of 3-phase secondary cable, one 50-foot and two 100-foot sections, stored in the RALS.
- These cables are used to provide the power from the secondary distribution center (SDC) to the unit.
- In most cases, the cables can be laid directly on the ground. However, bury the cables in areas of vehicle and pedestrian traffic.
- Do not connect the cables to the power source at this time.
- The lighting cables come in four 375-foot sections. Two of these sections make up one 750-foot lighting loop assembly (Figure, 2).
- Two lighting loop assemblies make up the entire lighting system.

- Layout the two loop cord assemblies starting at the RALS cabinet and extending out to the end of each circuit.
- As with the feeder cables, install these cables above ground except in high traffic areas. Connect each circuit to the appropriate plug on the RALS receptacle panel.

Step 3: Lights.

- There is a junction box every 125 feet along each lighting loop assembly.
- Remove and assemble the 12 light mounting pads (Figure, 3) from the RALS unit.
- Position and anchor one pad at each of the 12 junction box locations.
- Place 12 of the 13 telescopic light poles in each of the mounting pads.
- Secure the 13th pole to the RALS cabinet.
- Once you secure all the poles, attach the light fixtures and install the lamps.
- With the lamps and fixtures in place, extend the light poles up to their full height.
- Secure the power cord from each fixture to the poles and connect it to the junction box.
- Before you perform the operational checks, connect the feeder cable to the SDC.

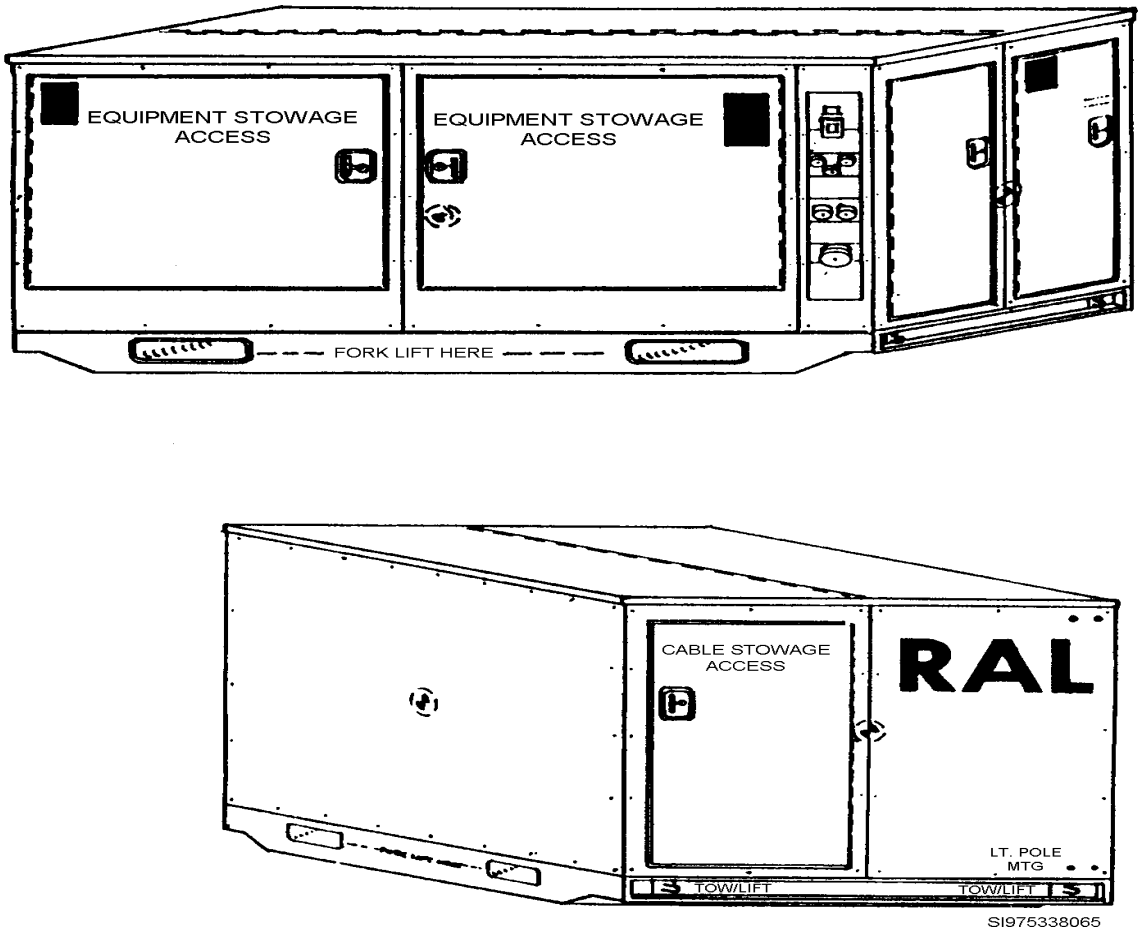


Figure 1, RALS cabinet.

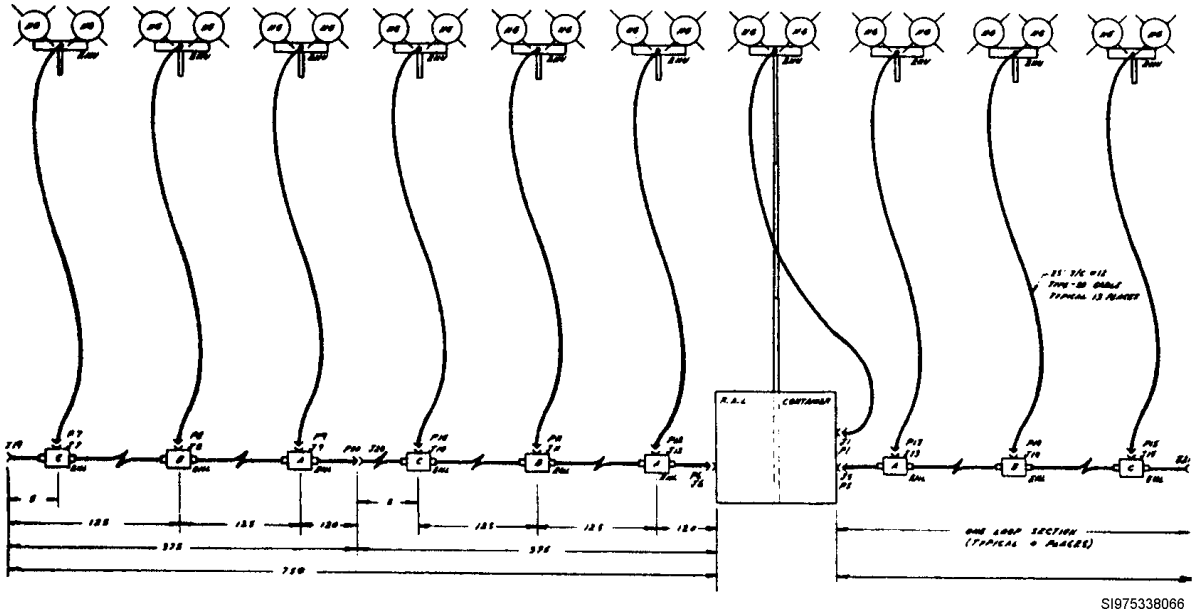


Figure 2, RALS lighting layout.

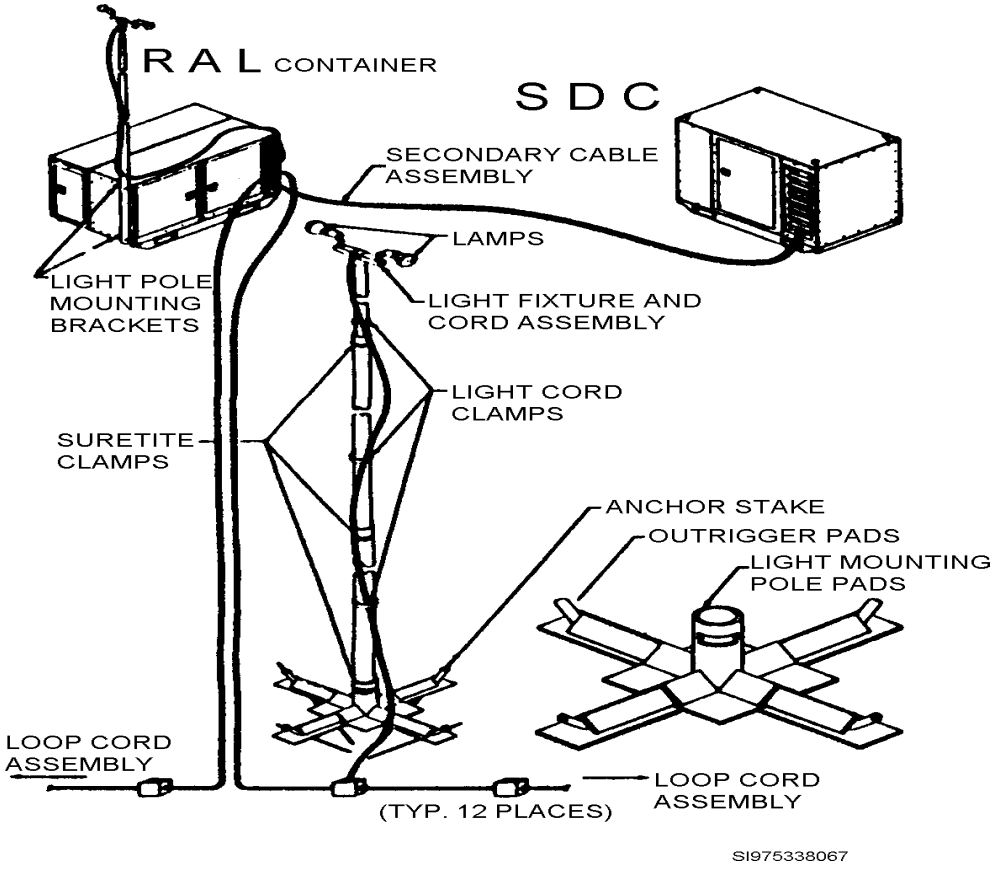


Figure 3, RALS components.

Review Questions for Installation

Question	Answer
1. What does the term RALS stand for?	a. Remote Area Lighting System b. Remote Aircraft Lighting System c. Runway Aircraft Lighting System d. None of the above
2. What is the power requirement for the RALS?	a. 120 / 208 DC b. 120 / 208 VAC c. 220 / 380 VAC d. 2400 / 4160 VAC
3. How long is one lighting loop assembly?	a. 200 ft b. 350 ft c. 500 ft d. 750 ft
4. What is the spacing of the junction boxes along the lighting loop assemblies?	a. 50 ft b. 125 ft c. 150 ft d. 350 ft

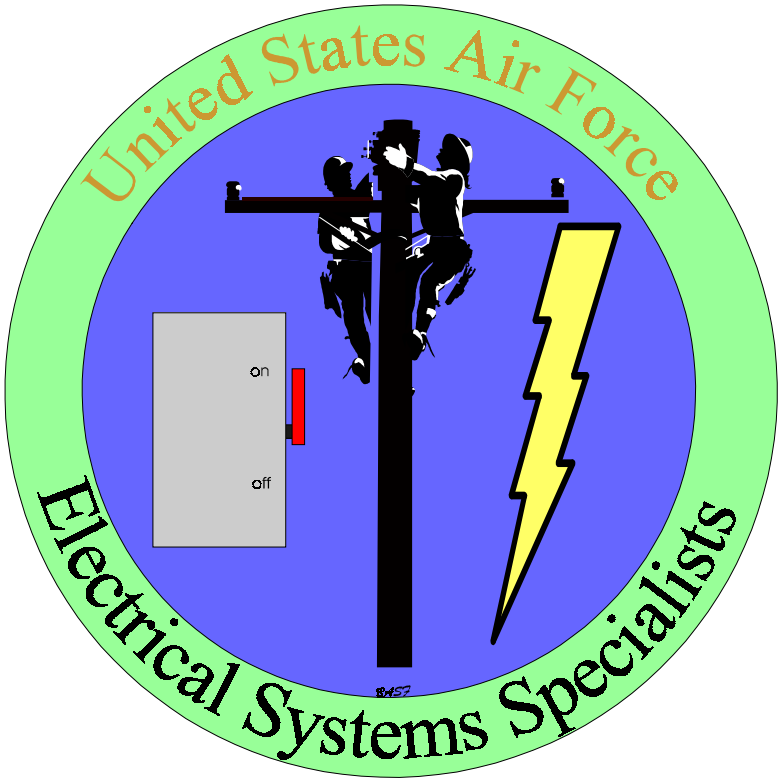
NOTE: After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8123	**Remote Area Lighting Set**

INSTALLATION

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee identify all the equipment needed for the job?		
2. Can trainee explain the proper layout of cables?		
3. Did trainee properly secure light mounting pole to pads?		
4. Did the trainee properly mount light fixtures to poles?		
5. Did trainee secure light cord to light mounting poles?		
6. Are light cord connectors securely connected to junction boxes?		
7. Are loop cord assemblies connected to lighting loop 1 and 2 receptacles?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
REMOTE AREA LIGHTING (RAL) SETS

MODULE 26 **AFQTP UNIT 2**

OPERATION (26.2.2.1.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

OPERATION
Task Training Guide

STS Reference Number/Title:	26.2.2.1.2., Operation
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Falcon Electrical Distribution System • AFI 32-1064, Electrical Safe Practices • TO 00-105A-12
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Personal Protective Equipment/Clothing • Hand Tools • Multimeter • Work Gloves
Learning Objective:	• The trainee will know the steps required to safely operate a Remote Area Lighting System.
Samples of Behavior:	• Trainee will be able to name the safety equipment required to operate Remote Area Light system. • Trainee will be able to operate a Remote Area Lighting System.
Notes:	
• To successfully complete this element, the steps must be followed exactly—no exceptions. • Any safety violation is an automatic failure.	

OPERATION

Background: When you are deployed to a bare-base site, time is of the essence. Your team is required to get the base mission ready within 72 hours. In order to meet this deadline, your team has to work around the clock. You need a reliable lighting source that can illuminate the work areas during the hours of darkness. The remote area lighting system meets this need. Not only does it provide all the light during base setup, but it can also be easily repositioned to meet other needs once the base is operational. Some of the other uses for the RALS are aircraft parking, munitions storage, and roadway lighting. In the event of actual setup, operation, and maintenance, refer to TO 00–105A–12, *Installation Operation and Maintenance instructions for the Remote Area Lighting System (RALS).* This system can be energized from any source that provides 120/208 VAC, 3-phase power.

To perform the task, follow these steps:

Step1: Post-installation checks.

- The following post-installation checks must be made before the system is ready for operation. You must ensure that:
- The light fixture and pole assemblies are firmly in place and the proper lamps (150-watt, PAR–38, mercury vapor) are installed.
- All fixture power cords and junction boxes are securely connected.
- The two loop assemblies are securely connected to the RALS receptacle panel.
- The mating ends of the secondary feeder cables linking the RALS with the SDC are properly connected.
- Once these checks are made, the system should be ready for initial turn-on procedures.

Step 2: Initial turn-on procedures.

- These procedures are designed to check the operation of the system and must be performed in the following order:
- Go to the SDC and set the circuit breaker that energizes the feeder cable receptacle to ON. This energizes the circuit breaker panel on the RALS.
- Now set the magnetic lighting contactor and the photo-cell override switch on the RALS breaker panel to ON. All of the lights should come on at this time.
- Once the lights come on, set the photo-cell override switch to OFF. At this time all lights in the circuit go out.
- Set the override switch to AUTO and cover the window of the photo-cell with an opaque object. The lights should turn on again in about 15 to 20 seconds. If you notice any problems with any of the fixtures, repair them at this time.
- Leave the photo-cell override switch in AUTO after all repairs are made. The system is now fully operational.

Review Questions for Operation

Question	Answer
1. What turns the RALS lights on during normal operation?	a. Circuit Breaker b. Photo Cell c. Switch d. Timer
2. What position should the OVERRIDE SWITCH be in during normal operation?	a. ON b. OFF c. AUTO d. REMOTE
3. What type of lamp does the RALS use?	a. High Pressure Sodium b. 60 watt incandescent c. 150-watt, PAR–38, mercury vapor d. 100 watt mercury vapor

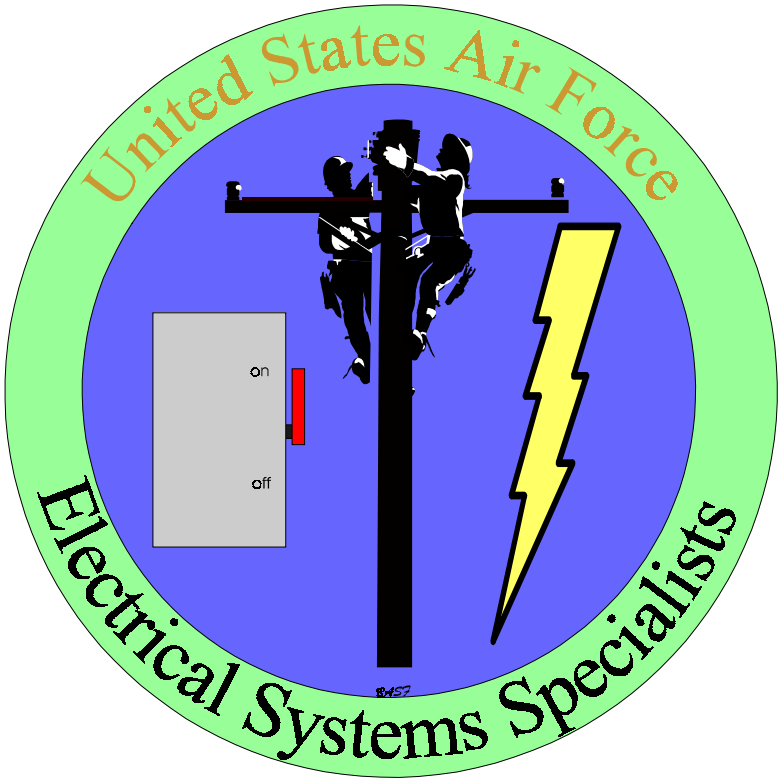
NOTE: After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8123	**Remote Area Lighting Set**

OPERATION

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee ensure that 150 watt, PAR-38, mercury vapor lamps are used?		
2. Can trainee explain the proper layout of cables?		
3. Did trainee properly explain how cords and junction boxes are connected?		
4. Did the trainee properly check the operation of the photocell?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
REMOTE AREA LIGHTING (RAL) SETS

MODULE 26 **AFQTP UNIT 2**

MAINTENANCE (26.2.2.1.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

MAINTENANCE
Task Training Guide

STS Reference Number/Title:	26.2.2.1.3., Maintenance
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Eagle Electrical Distribution System • AFI 32-1064, Electrical Safe Practices • TO 00-105A-12
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Personal Protective Equipment/Clothing • Hand Tools • Multimeter • Work Gloves
Learning Objective:	• The trainee will know the steps required to safely maintain a Remote Area Lighting System.
Samples of Behavior:	• Trainee will be able to name the safety equipment required to maintain a Remote Area Lighting system. • Trainee will be able to maintain a Remote Area Lighting System.
Notes:	
• To successfully complete this element, the steps must be followed exactly—no exceptions. • Any safety violation is an automatic failure.	

MAINTENANCE

Background: The RALS is a very reliable lighting system if it is installed properly. However, as with any lighting system, recurring maintenance is required in order to keep it that way. Keep in mind that this system is designed to be, and may be required to be mobilized at a moment's notice. Therefore, the entire system must be maintained in a fully operational status, including the storage cabinet itself. All inspections and maintenance are performed quarterly unless otherwise stated.

To perform the task, follow these steps:

Step 1: Lamps and fixtures.

- Check the lamp fixtures and mounting poles for security, condition, and corrosion.
- Check the condition of the lamps.
- Correct any found discrepancies.

Step 2: Circuit breakers and fuses.

- Check the breakers and fuses for condition and operability.
- Check the fuse holders, breaker mounts, and electrical connections for corrosion and broken items.
- Repair or replace any items that are defective.

Step 3: Lighting loop assemblies.

- Make sure all connectors on each of the two circuits are secure and free of corrosion.
- Make a thorough inspection of the cables to check for damaged insulation.
- Repair any discrepancies.
- Excessive corrosion warrants the replacement of the connectors.

Step 4: RALS structure.

- Check the RALS structure semiannually for structural damage, condition of paint, cleanliness of storage compartments, and corrosion.
- Repair any structural damage and clean all storage compartments.
- If any corrosion is found, remove the corrosion with sandpaper or a wire brush and repaint the affected area.
- Paint chipped or scratched areas to prevent corrosion from starting.

Review Questions for Maintenance

Question	Answer
1. How often should RALS structure be inspected?	a. Monthly b. Quarterly c. Semiannually d. Annually
2. Circuit Breakers should be inspected _____.	a. Monthly b. Quarterly c. Semi-annually d. Annually
3. Which RALS components are checked for corrosion and broken items?	a. Fuse holders b. Breaker Mounts c. Electrical connections d. All of the above
4. If any corrosion is found on the RALS structure, remove it with sandpaper and repaint the affected area.	a. True b. False

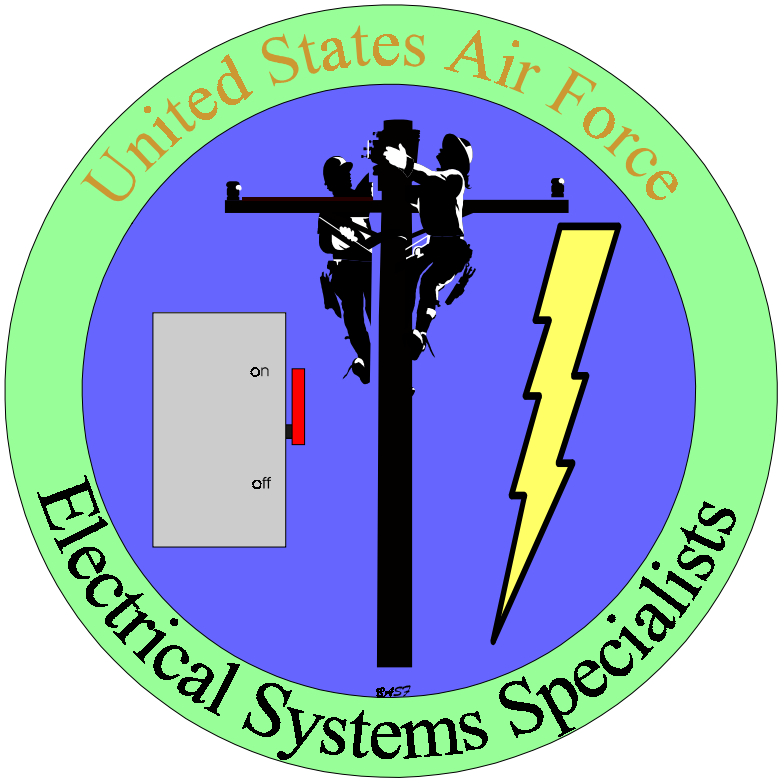
NOTE: After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8123	**Remote Area Lighting Set**

MAINTENANCE

Performance Checklist			
Step		**Yes**	**No**
1. Does the trainee know the major areas maintained on the RALS?			
a.	Lamps and fixtures		
b.	Circuit breakers and fuses		
c.	Lighting loop assemblies		
d.	RALS structure		
2. Does trainee know all inspection and maintenance time frames?			

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
FIELD LAUNDRY

MODULE 26 **AFQTP UNIT 2**

POWER SUPPLY INSTALLATION (26.2.2.3.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

POWER SUPPLY INSTALLATION
Task Training Guide

STS Reference Number/Title:	26.2.2.3.1., Power Supply Installation
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Eagle Electrical Distribution System • TO 50D1-3-1, Standard Bare Base Laundry Facility • TO 10-4510-206-14, M-80 Boiler • TM 01243E-14/1 (Marines)
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electricians hand tools
Learning Objective:	• The trainee will know the steps required to safely provide electricity to the field laundry.
Samples of Behavior:	• Trainee will know the equipment needed and the power requirements necessary for installation.
Notes:	
• Any safety violation is an automatic failure.	

POWER SUPPLY INSTALLATION

Background: The field laundry facility is an air transportable unit that is used to provide clean clothes and linen for all field personnel. It is your responsibility to provide, connect, and maintain the electrical system of this facility. When actual installation and maintenance is required, refer to TO 50D1–3–1, Operation and Maintenance of the Standardized Bare Base Laundry Facility. The laundry unit consists of an electrical panel, washer, extractor (used for spin drying), dryer, air compressor, water pump, clothes bin, and water heater. The necessary interconnecting cables are located in a storage bin on the washer platform. The unit can be energized by any external power source that is capable of delivering 120/208 VAC, 3 phase, 60 amps.

To perform the tasks, follow these steps:

Step 1: Power supply installation.

- An electrical panel which is mounted on the platform assembly provides power distribution to all components of the laundry facility. This panel includes the necessary circuit breakers, receptacles, and connecting plugs for powering facility components. The laundry unit can be powered from any number of reliable sources. However, it most likely gets its power from an SDC when it is deployed as part of the Harvest Falcon kit. This power supply energizes the distribution panel by way of the main power cable (fig. 1).
- The power fed from the main power cable goes through the 60-amp main circuit breaker and feeds three bus bars inside the distribution panel. The bus energizes seven 3-pole, 20-amp circuit breakers and two 1-pole, 20-amp circuit breakers. When you face the circuit breaker panel, even numbered circuit breakers are on the right and odd numbered breakers are on the left.

Step 2: Water pump.

- Electrical power for the water pump is fed from circuit breaker number 2 through the 25-foot power cable and into the receptacle on the pump assembly (Figure, 2). The water pump should be the first component energized when the laundry unit is brought on line. If a phase rotation meter is not available, the rotation of the pump motor can be used to check proper phase sequence. The motor should be rotating in the direction of the arrow on the pump housing. If it is not, reverse the positions of any TWO phase wires on the power supply.

Step 3: Air compressor.

- The air compressor power is fed from circuit breaker number 7.
- No electrical connections are required to the compressor because it is already hard wired in, and mounted to, the platform. For cable and component location (refer to Figure, 3).

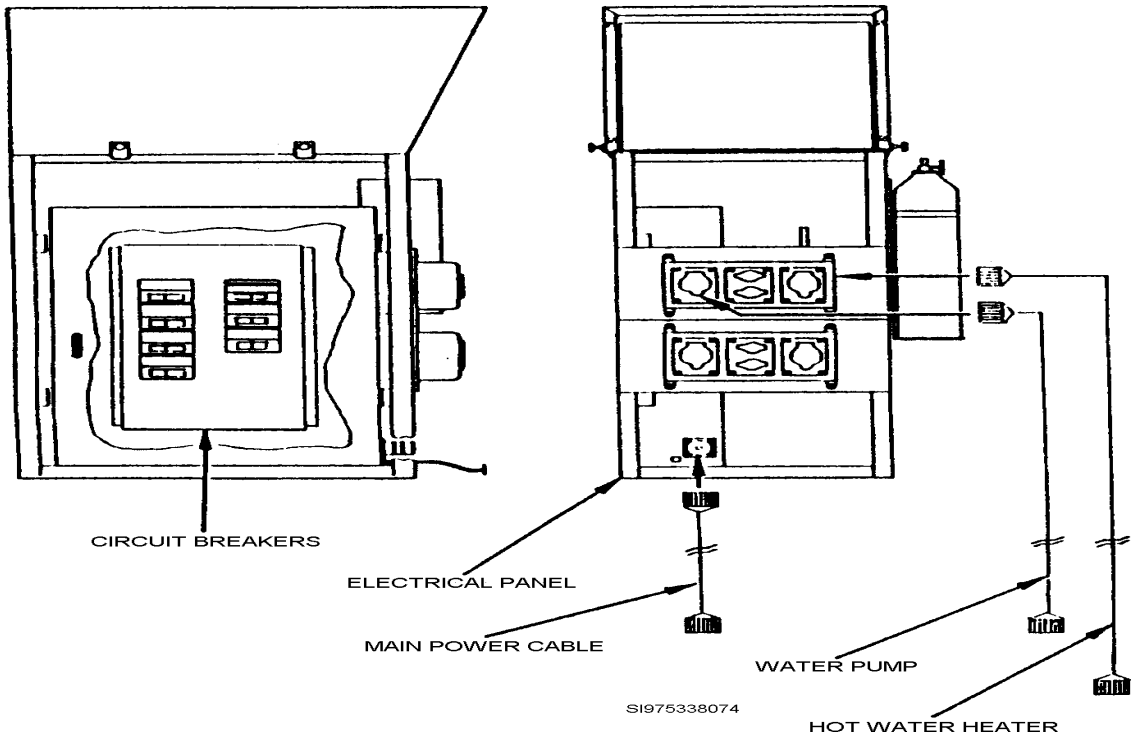


Figure 1, Laundry unit main power panel.

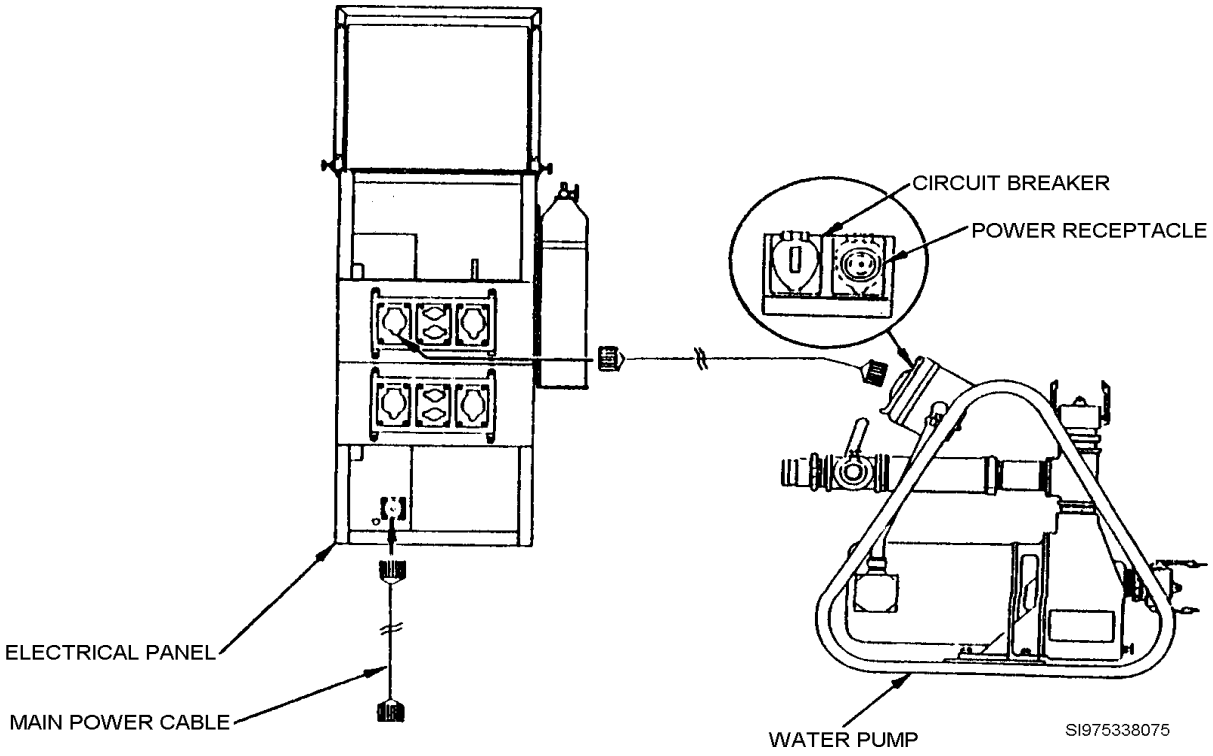


Figure 2, Water pump interconnection.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

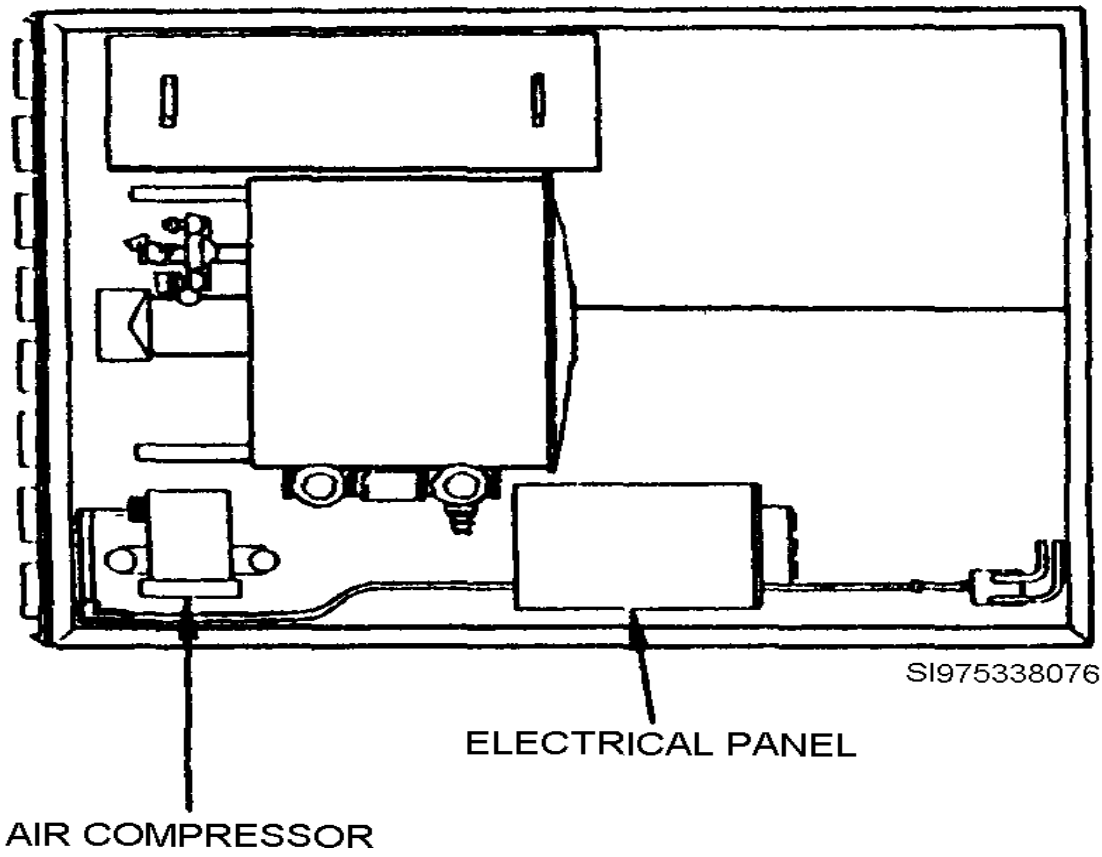


Figure 3, Air compressor placement.

Step 4: Washer.

- Three-phase electrical power for the washer is fed from circuit breaker number 3 directly to the washer control assembly. The connections are hard wired and require no installation.

Step 5: Platform interconnection.

- There are two electrical connections that must be made between the two platforms once they have been positioned (Figure, 4). The two circuits are for the extractor and the dryer. Make sure the connections do not get crossed.

Step 6: Extractor.

- The electrical supply for the extractor is fed from circuit breaker number 6, through the platform interconnection point, and on to the extractor. With the exception of the platform interconnection plugs, no other circuit installation procedures are required.

Step 7: Dryer.

- The dryer is fed from circuit breaker number 8 through one of the platform interconnections. As with the extractor, the platform interconnection is the only installation requirement.

Step 8: Grounds.

- There are four ground rods for each of the two laundry unit platforms (eight for the entire unit). Drive each rod into the soil and connect the ground wire to the grounding lug on the platform (Figure, 5). Make sure that the ground rod, wire, and lug are free of paint.

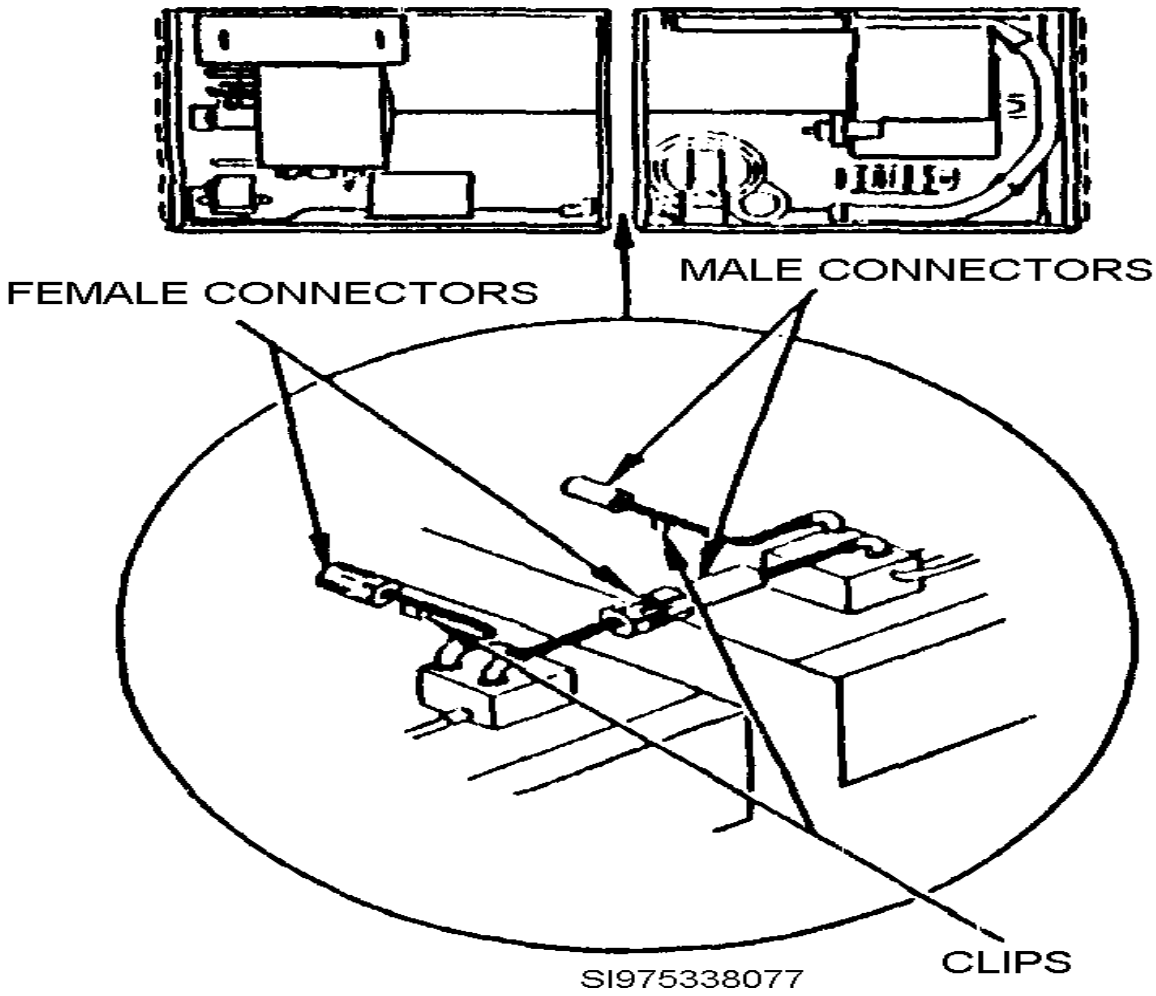


Figure 4, Platform interconnection.

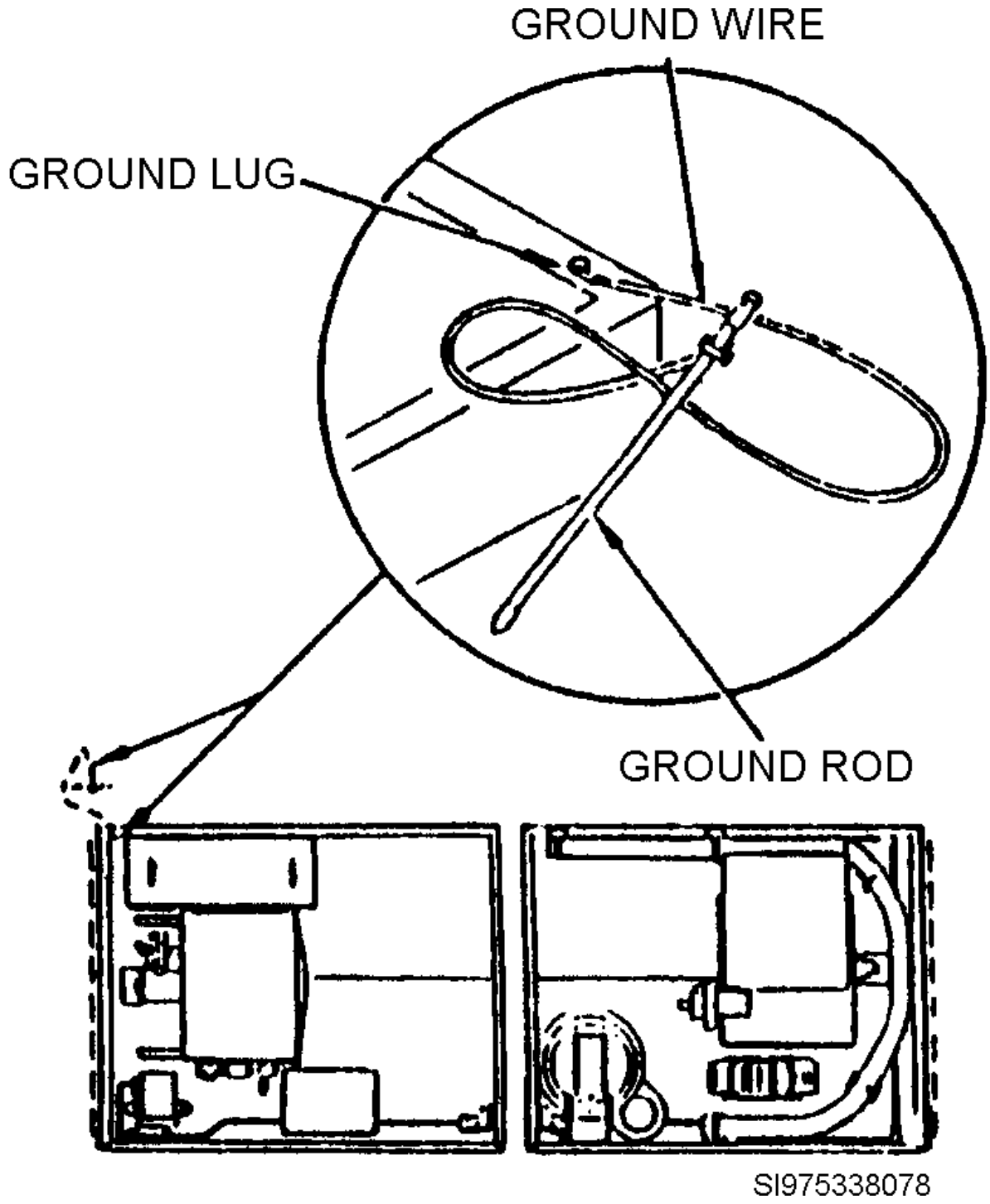


Figure 5, Laundry unit grounds.

Review Questions
for
Power Supply Installation

Question	Answer
1. What are the power requirements for the field laundry unit?	a. 110 VAC 1, phase 60 amps. b. 120/208 VAC 3, phase 60 amps. c. 110 VAC 3, phase 50 amps. d. 208 VAC 1, phase 50 amps.
2. How can you check the phase rotation if a phase rotation meter is not available?	a. By observing the rotation of the electrical panel motor. b. By observing the rotation of the phases in the water pump. c. By observing the rotation if the motor on the water pump. d. None of the above.
3. What precaution must you take when you make the platform interconnections?	a. Not to break the connector ends. b. Not to force the connector ends together. c. Not to cross the connections. d. Ensure the connections are lined up properly.
4. How many ground rods are used when the unit is in operation?	a. 1. b. 2. c. 4. d. 8.

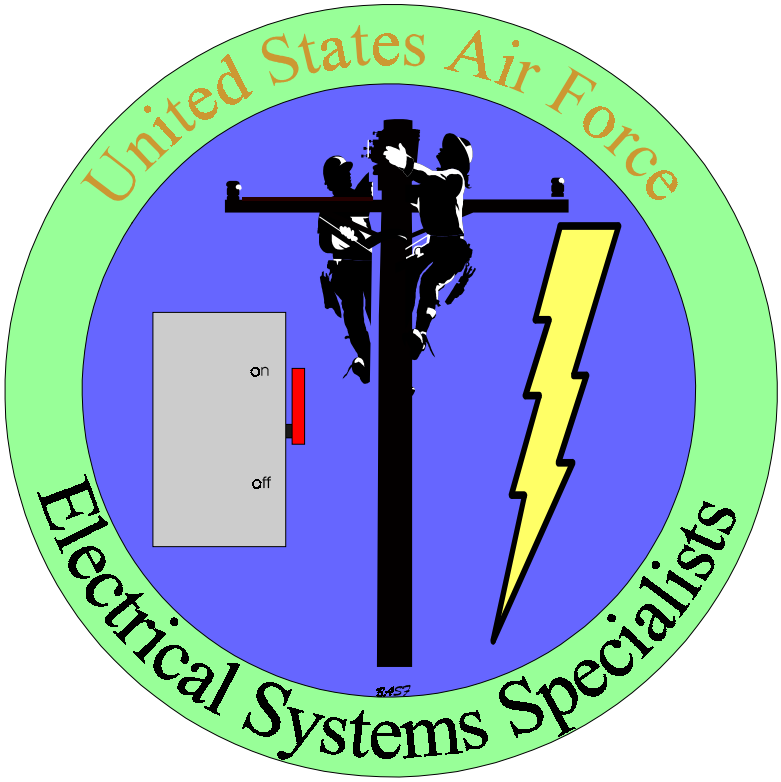
NOTE: After completion of this lesson, see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8119	**Field Laundry Power Supply Installation**

POWER SUPPLY INSTALLATION

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee know the power requirements for the laundry?		
2. Does the trainee know where the field laundry gets its power from when deployed as part of the Harvest Falcon kit?		
Does trainee know where to make the connections in the breaker box?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON/EAGLE KITCHEN EQUIPMENT

MODULE 26 AFQTP UNIT 2

POWER SUPPLY INSTALLATION (26.2.2.4.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

POWER SUPPLY INSTALLATION
Task Training Guide

STS Reference Number/Title:	26.2.2.4.1., Power supply installation
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Eagle Electrical Distribution System • TO 35E4-169-1 • CDC 3E0X1B, Vol. 4 • AFPAM 10-219, Vol. 5
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electrical hand tools
Learning Objective:	• The trainee will know the steps required to safely provide electricity to Harvest Falcon/Eagle Kitchen Equipment.
Samples of Behavior:	• Trainee will know the difference between Harvest Falcon/Eagle Kitchen Facilities. • Trainee will know the sequence of electrical connections
Notes:	
• Any safety violation is an automatic failure.	

POWER SUPPLY INSTALLATION

Background: The Harvest Falcon/Eagle kitchen facilities are completely portable food preparation and serving complexes. The Harvest Falcon kit (Figure, 1) is designed to serve up to 1,100 personnel and seat 240. The Harvest Eagle kitchen facility (Figure, 2) is designed to serve up to 550 personnel and seat 120. All tools, supplies, and equipment, with the exception of electrical and water supplies, are supplied in the kits. Refer to the appropriate TO in the event of actual facility installation and maintenance.

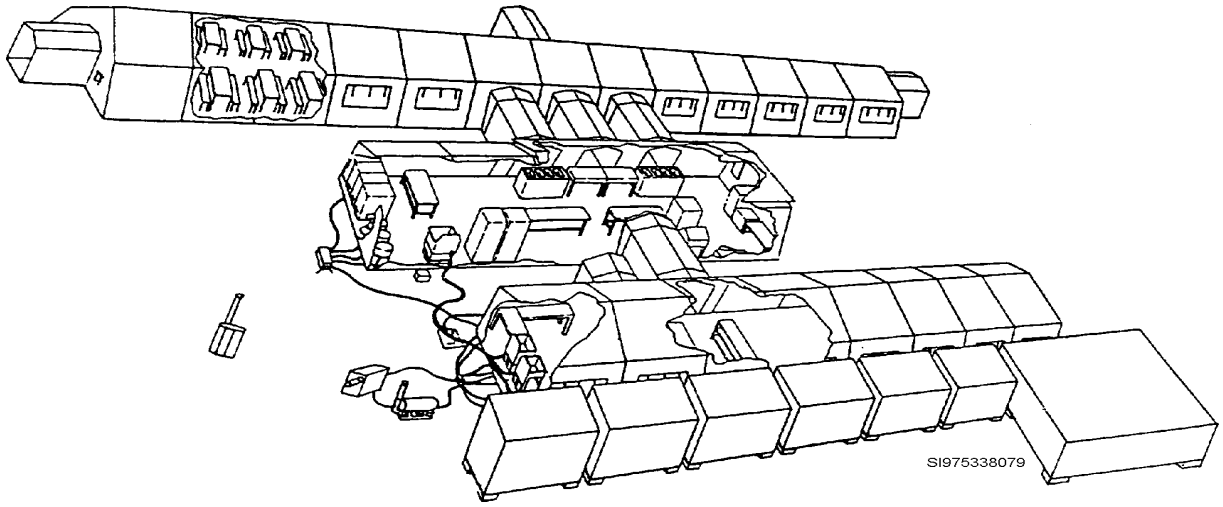


Figure 1, Harvest Falcon kitchen.

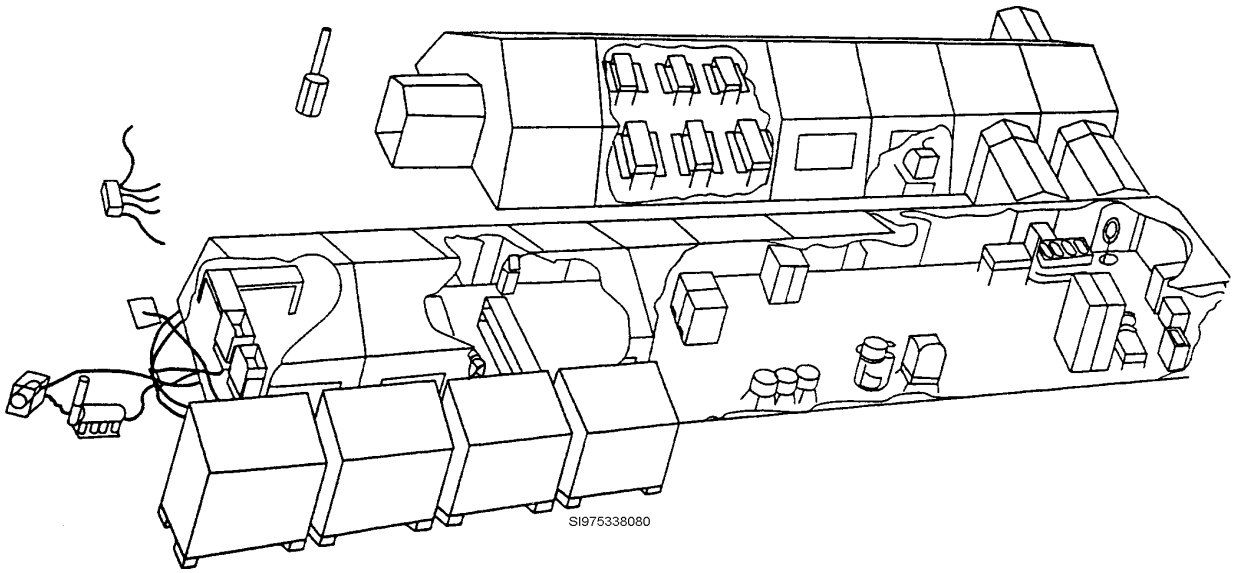


Figure 2, Harvest Eagle kitchen.

To perform the task, follow these steps:

Step 1: Power supply installation (Harvest Falcon).

- The Harvest Falcon kitchen must be fed by a 120/208-VAC power source that is capable of meeting its heavy load demands. Although other assets are capable of meeting these voltage levels, the load demands dictate providing the facility with its own dedicated SDC. The facility electrical system uses every available receptacle on the SDC. (Figures 3 and 4) show the entire Harvest Falcon distribution circuit layout.

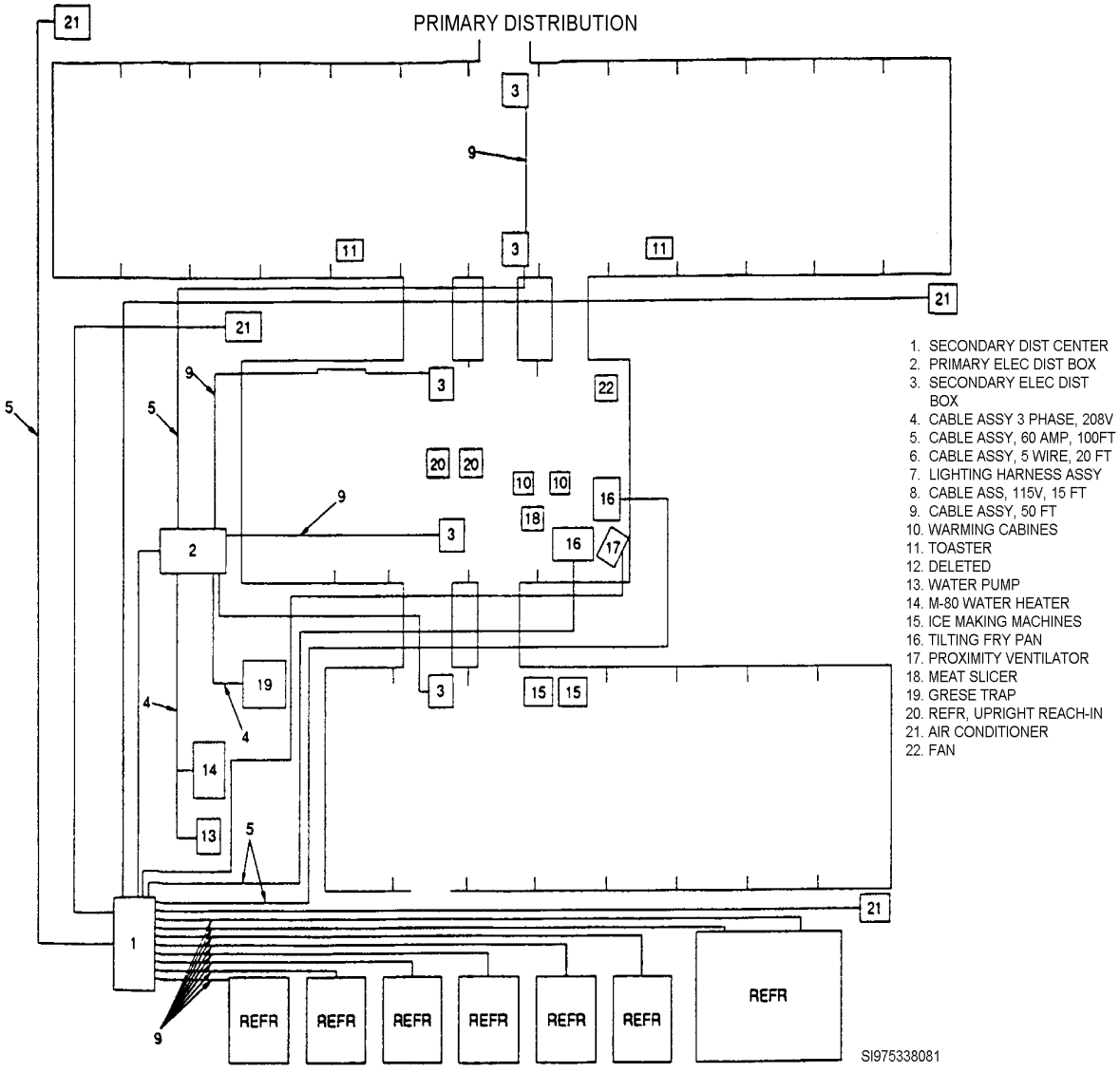


Figure 3, Harvest Falcon kitchen primary distribution layout.

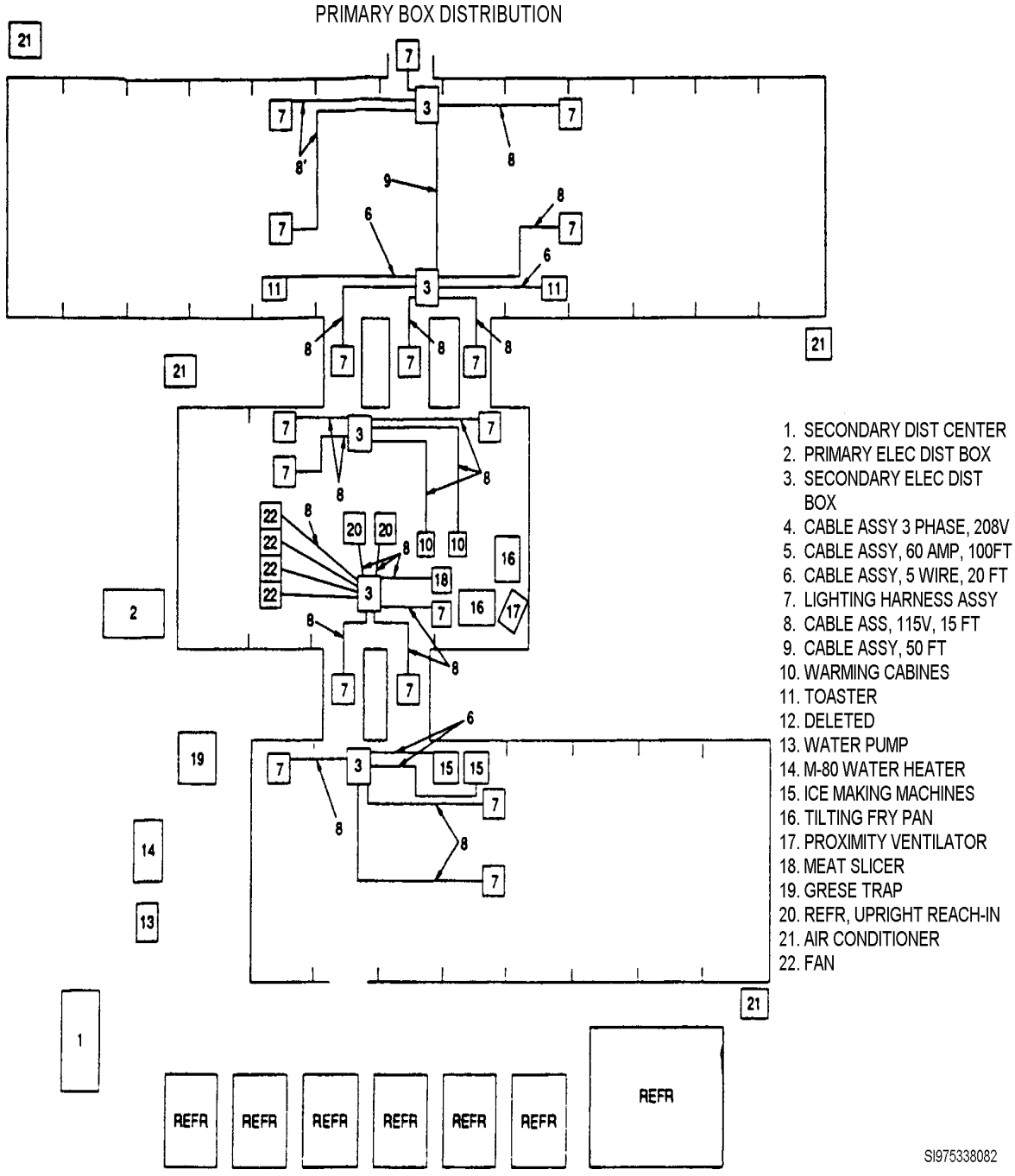


Figure 4, HF kitchen secondary distribution.

Step 2: Power supply (Harvest Falcon).

- The SDC supplies power to the following circuits:
- Eight circuits feed the walk-in refrigeration units through 50-foot, 3-phase, 60-amp cable assemblies.

- Four circuits feed the air-conditioners through both 50 and 100-foot, 3-phase, 60-amp cable assemblies.
- Two circuits feed the tilting fry pan appliances through 100-foot, 3-phase, 60-amp cable assemblies.
- One circuit feeds the kitchen proximity ventilator through a 100-foot, 3-phase, 60-amp cable assembly.
- One circuit feeds the primary distribution box through a 50-foot, 3-phase 60-amp cable assembly.

Step 3: Primary distribution box (Harvest Falcon).

- The primary distribution box (Figure, 5) receives its power from the SDC and supplies power to seven different circuits. The circuits include the five secondary electrical distribution boxes, the water pump, and the water heater.

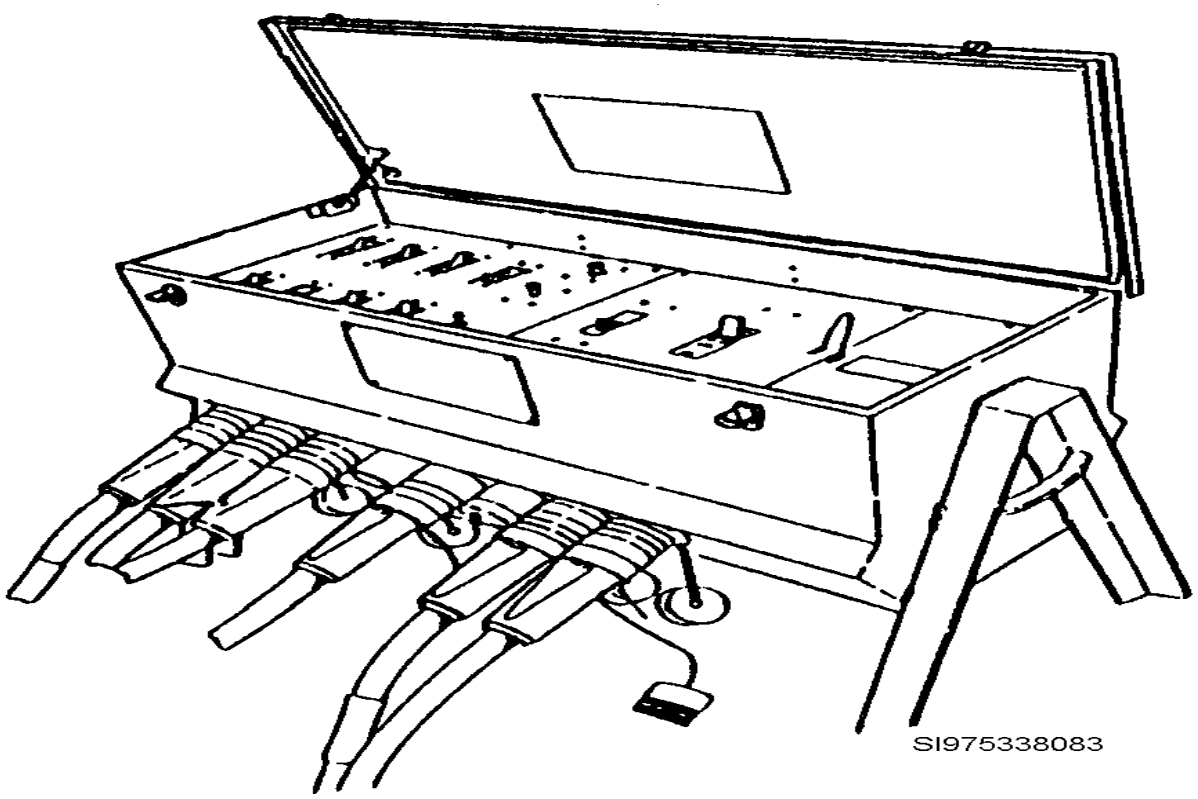


Figure 5, Primary distribution box.

Step 4: Secondary electrical distribution boxes (Harvest Falcon).

The secondary electrical distribution boxes (Figure, 6) supply power to a number of different appliances and equipment as illustrated in (Figure, 4). The equipment that receives power from the boxes includes light circuits, fans, upright refrigerators, warming cabinets, ice machines, toasters, and a meat slicer.

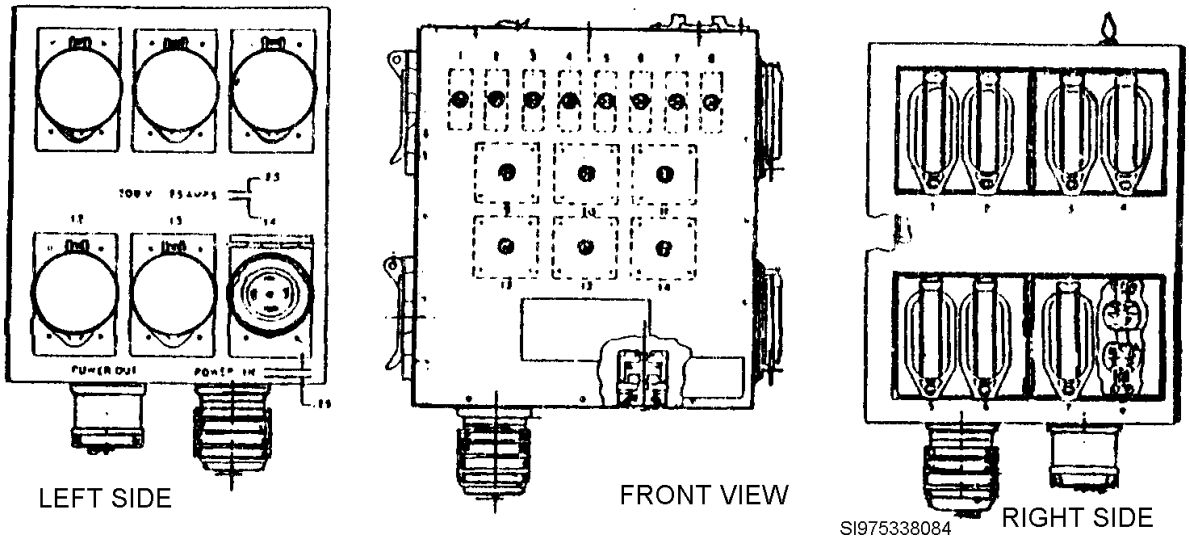


Figure 6, Secondary distribution box.

Step 5: Power supply installation (Harvest Eagle).

- The Harvest Eagle kitchen is much smaller than the Harvest Falcon kitchen. Due to its reduced size and load requirements, this facility gets all the power it needs from one 60-kW and one 30-kW generator (Figure, 7). The generators provide power to the entire facility by way of the two primary distribution boxes. The boxes not only serve as distribution points, they also provide circuit protection as well.

Step 6: Distribution boxes (Harvest Eagle).

- One of the distribution boxes feeds the four refrigerators, two air-conditioners, and two of the four secondary electrical distribution boxes. The other distribution box feeds the grease trap, water heater, water pump, tilting fry pan, air-conditioner, and one of the four secondary electrical distribution boxes.

Step 7: Secondary electrical distribution boxes (Harvest Eagle).

- The secondary electrical distribution boxes feed three fans, two light circuits, an upright refrigerator, meat slicer, warming cabinet, and a toaster (Figure, 8).

Step 8: Protect cables.

- One important thing to keep in mind when you install either kitchen is the protection of your distribution cables. Remember, the Harvest Falcon facility is designed to feed 1,100 people per meal. That many people walking around could destroy your distribution cables in no time. Bury the cables in any area where you expect a high volume of traffic.

NOTE:
If for any reason you are unable to bury them, fabricate a platform so people can walk over them.

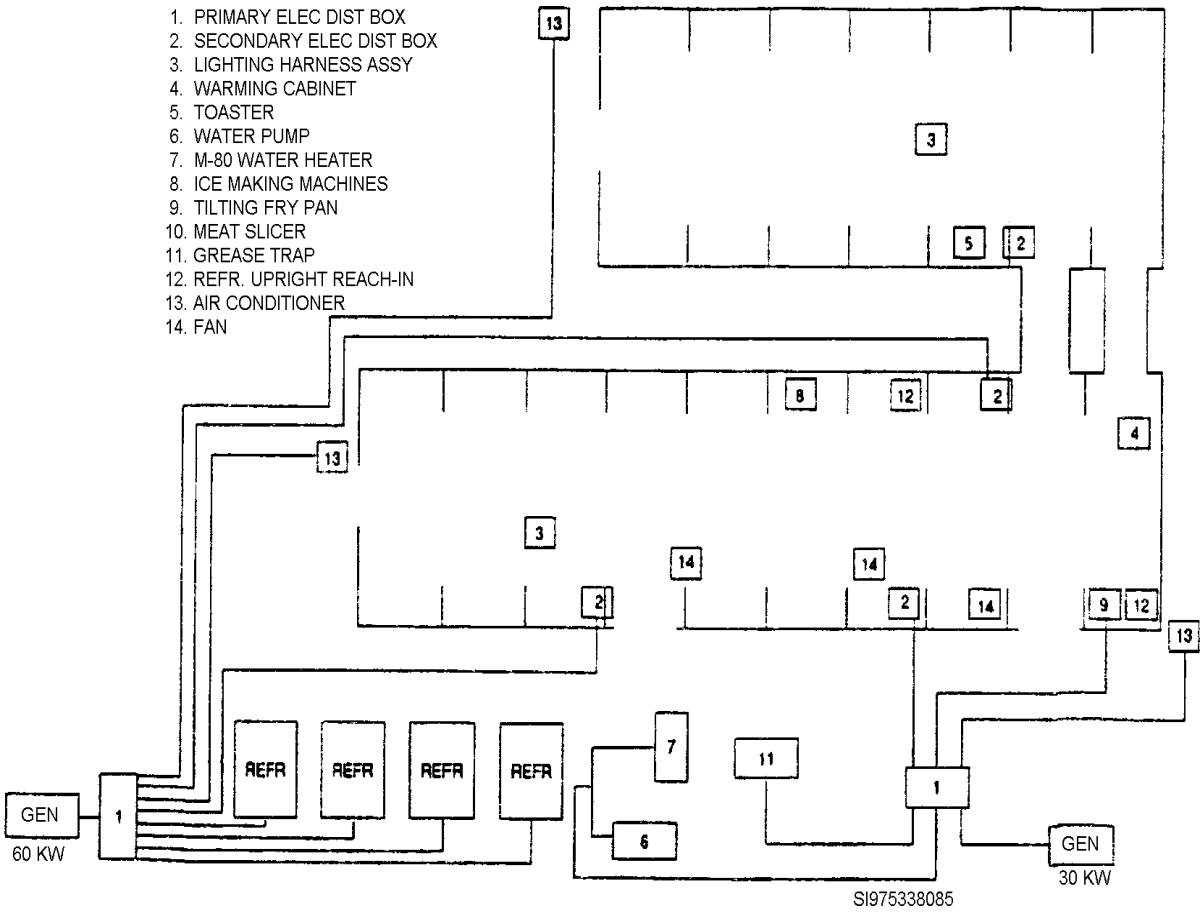


Figure 7, Harvest Eagle kitchen primary distribution.

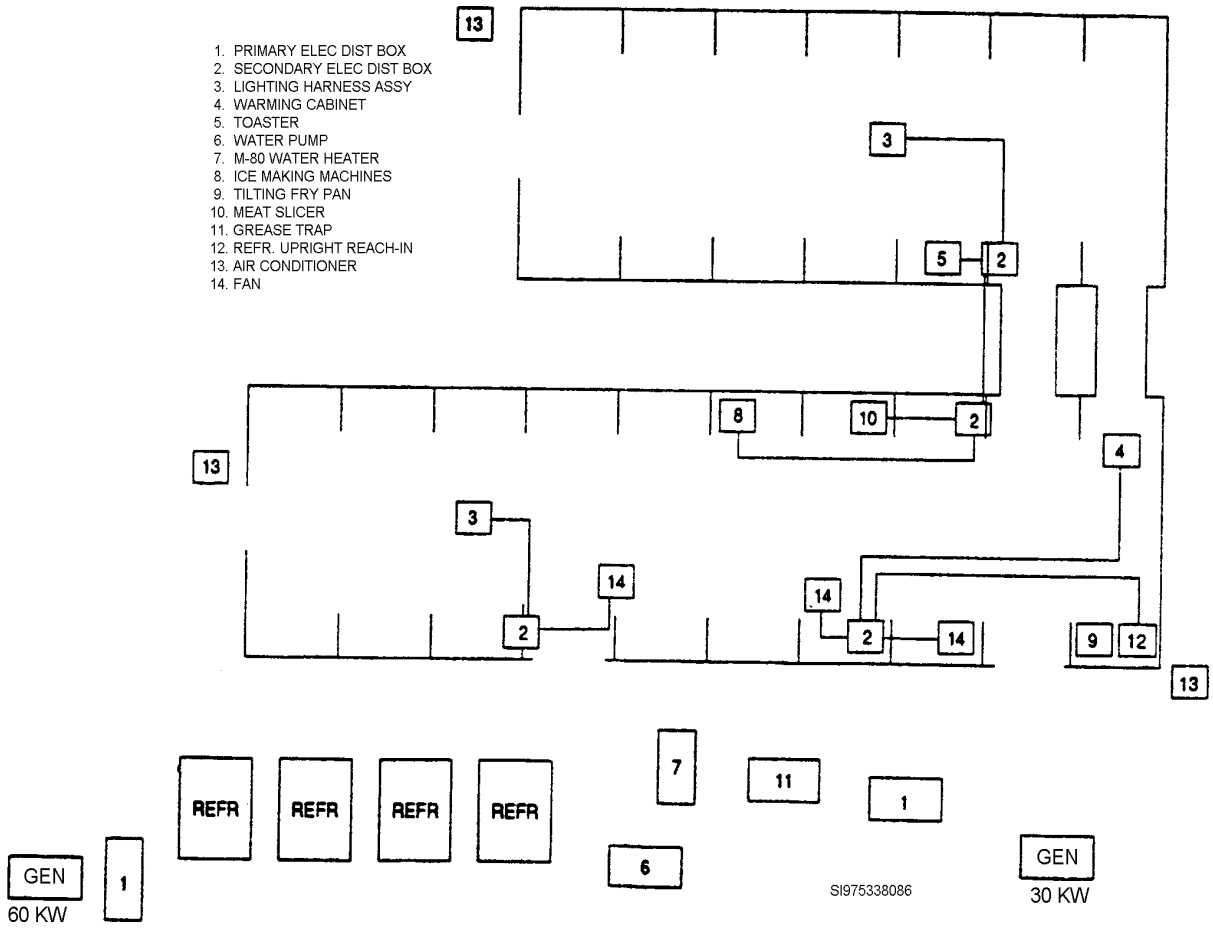


Figure 8, Harvest Eagle kitchen secondary distribution.

Review Questions
for
Power Supply Installation

Question	Answer
1. What is the voltage requirement for the Harvest Falcon kitchen facility?	a. 110 / 120 VAC. b. 120 / 208 VAC. c. 110 / 208 VAC. d. None of the above.
2. What piece of equipment is used to distribute voltage to the entire Harvest Falcon kitchen facility?	a. Primary electrical distribution box. b. Erdlator control. c. Secondary distribution center. d. None of the above.
3. What is/are used to supply power to the Harvest Eagle kitchen?	a. One 60 and one 30-kWgenerators. b. One 60 and two 30-kW generators. c. Two 60 and one 30-kW generators. d. Two 60 and two 30-kW generators.
4. In order to protect power cables they are buried or a platform is placed over them to prevent people from walking on them.	a. True b. False
5. The total rating of the two generators needed to power the Harvest Eagle kitchen is _____.	a. 90-kW. b. 120-kW. c. 150-kW. d. 310-kW.
6. What major component of the Harvest Eagle kitchen electrical system, not only acts as a distribution point, but also provides circuit protection?	a. Primary distribution box. b. Circuit protection center. c. Secondary distribution box. d. Secondary distribution center.
7. What is the amp rating of the cable, going from the SDC to the appliances?	a. 50 amp cable. b. 60 amp cable. c. 70 amp cable. d. 80 amp cable.
8. How many circuits feed the walk-in refrigeration units in the Harvest Eagle kitchen?	a. 1. b. 2. c. 4. d. 8.

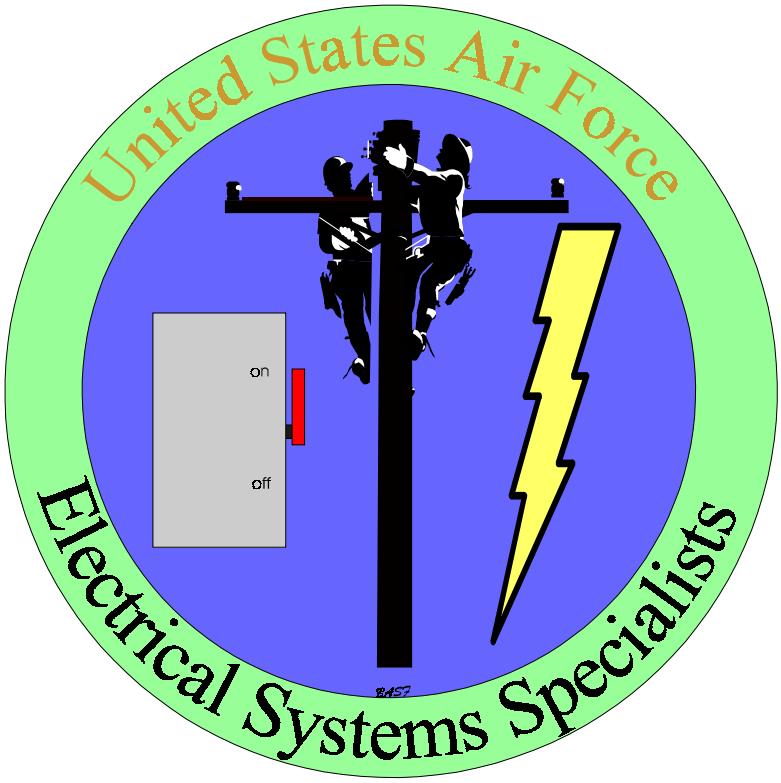
NOTE: After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8121	**Harvest Falcon/Eagle Kitchen Equipment**

POWER SUPPLY INSTALLATION

Performance Checklist		
Step	**Yes**	**No**
1. Does the trainee know the voltage requirements for the Harvest Falcon/Eagle kitchen facilities?		
2. Does the trainee know the main power sources for the Harvest Falcon/Eagle kitchen facilities?		
3. Does trainee know Main components of the Harvest Falcon/Eagle kitchen facilities?		
4. Does trainee know the layouts for the Harvest Falcon/Eagle kitchen facilities?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON/EAGLE KITCHEN EQUIPMENT

MODULE 26 AFQTP UNIT 2

MAINTENANCE (26.2.2.4.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

MAINTENANCE
Task Training Guide

STS Reference Number/Title:	26.2.2.4.2., Maintenance
Training References:	• TO 35E4-169-1 • CDC 3E0X1B, Vol. 4 • AFPAM 10-219, Vol. 5
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electrical hand tools
Learning Objective:	• The trainee will know the steps required to safely maintain Harvest Falcon/Eagle facilities.
Samples of Behavior:	• Trainee will know the difference between Harvest Falcon/Eagle Kitchen Facilities.
Notes:	
• Any safety violation is an automatic failure.	

MAINTENANCE

Background: The Harvest Falcon/Eagle kitchen facilities are completely portable food preparation and serving complexes. The Harvest Falcon kit is designed to serve up to 1,100 personnel and seat 240. The Harvest Eagle kitchen facility is designed to serve up to 550 personnel and seat 120. All tools, supplies, and equipment, with the exception of electrical and water supplies, are supplied in the kits. Refer to the appropriate TO in the event of actual facility installation and maintenance. Your responsibilities for the maintenance of the kitchens are really quite limited.

To perform the task, follow these steps:

Step 1: Kitchen checks.

- Check all of the following prior to operation, every week while in operation, and prior to disassembly.
- Check all electrical connections of cables, receptacles, circuit breakers, and light assemblies for damage, burned contacts, and insulation breakdown.
- Check for security of attachment of all electrical items.
- Check light assemblies for burned out lamps.

SAFETY:
ENSURE THAT ALL POWER IS DISCONNECTED FROM EQUIPMENT PRIOR TO MAINTENANCE.

Review Questions for Maintenance

Question	Answer
1. How often is the Harvest Eagle kitchen inspected while in operation?	a. Daily b. Weekly c. Monthly d. Semi-annually
2. When inspecting light assemblies you are checking for _____.	e. Damage f. Burned contacts g. Insulation breakdown h. All of the above
3. Harvest Falcon/Eagle kitchens are inspected prior to installation, weekly while in operation, and prior to disassembly.	i. True j. False

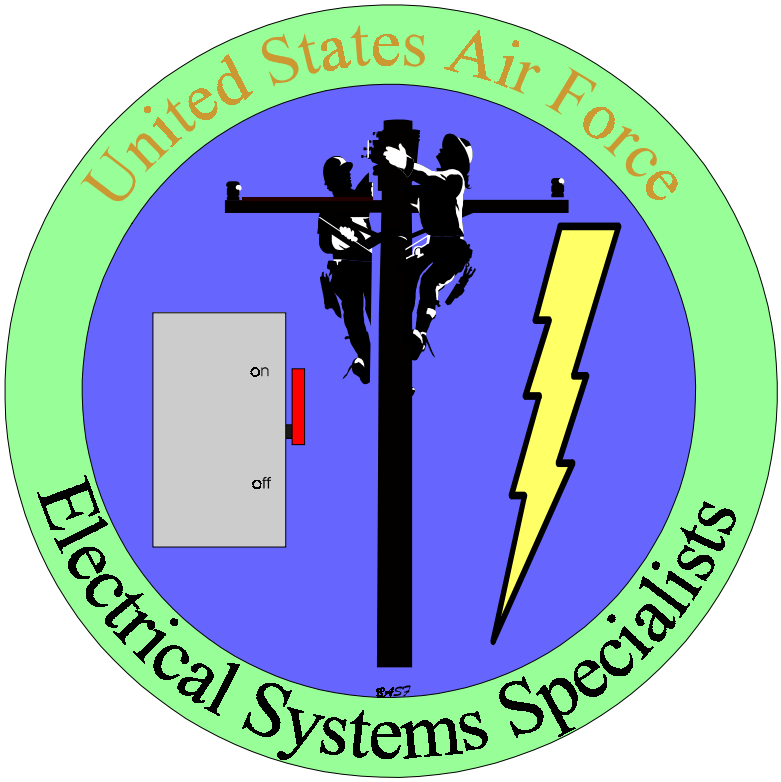
After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8121	**Harvest Falcon/Eagle Kitchen Equipment**

MAINTENANCE

Performance Checklist		
Step	**Yes**	**No**
1. Does the trainee know the maintenance schedule for Harvest Falcon/Eagle kitchens?		
2. Does the trainee know what to look for when inspecting Harvest Falcon/Eagle kitchens?		
3. Does trainee know the safety requirements required for maintenance of the Harvest Falcon/Eagle kitchen facilities?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

PRIMARY DISTRIBUTION SYSTEM (26.2.2.6.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

PRIMARY DISTRIBUTION SYSTEM
Task Training Guide

STS Reference Number/Title:	26.2.2.6.1., Primary Distribution System
Training References:	• CD-ROM, 3E0X1-26.2.2.6.1, Harvest Falcon Electrical Distribution System • AFI 32-1064, Electrical Safe Practices • AFPAM 10-219, Vol. 5 • T0 00-105A-12 • TO 35CA1-2-6-1
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hot Sticks • Rubber Gloves • Multi Meter • High Voltage Tester • Megger • Phase rotation meter • Work Gloves • Hand Tools
Learning Objective:	• The trainee will learn the steps required to safely Install, Maintain, and Troubleshoot Bare Base Electrical distribution system.
Samples of Behavior:	• Trainee will be able to name the safety equipment required to Install, Maintain, and Troubleshoot a Bare Base Electric Power Distribution System. • Trainee will know the required steps to Install, Maintain, and Troubleshoot a Bare Base Electric Distribution System.
Notes:	
• To successfully complete this element, the steps must be followed exactly—no exceptions. • Any safety violation is an automatic failure.	

PRIMARY DISTRIBUTION SYSTEM

Background: The Bare Base Electrical Distribution System is comprised of MEP 12 power generators rated at 75O kw with an output of 2400/ 4160. Power Distribution Centers (PDC) which provide switching control of up to 6 primary circuits distributed through out the base. Secondary Distribution Centers that step down the 4160V to 120/ 208V to supply power for tents, buildings, and other equipment. You may be required to set up a bare base electrical distribution system at any time or any place in the world. The purposes may range from natural disasters, such as Hurricane Andrew at Homestead AFB, Fla. to support military operations such as Desert Shield/Desert Storm.

- ***To accomplish this lesson, complete:*** **AFQTP, CD-ROM, 3E0X1-26.2.2.6, Harvest Falcon Electrical Distribution System**

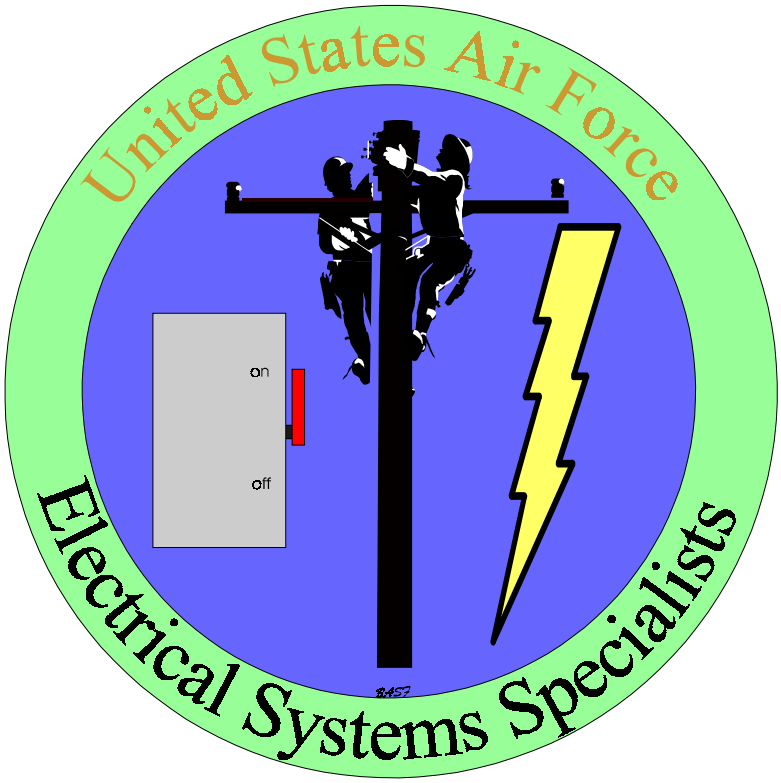
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8044	**Harvest Falcon Electrical Distribution System**

PRIMARY DISTRIBUTION SYSTEM

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee properly explain the installation procedure for a PDC?		
2. Did trainee explain the operating principles of the PDC?		
3. Did trainee explain the process of isolating the PDC under normal conditions?		
4. Did trainee explain the process of isolating a PDC output circuit in an emergency situation, under load?		
5. Did trainee identify basic layout of the PDC?		
6. Did trainee list basic components of the PDC and explain their function?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

SECONDARY DISTRIBUTION SYSTEM (26.2.2.6.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

SECONDARY DISTRIBUTION SYSTEM
Task Training Guide

STS Reference Number/Title:	26.2.2.6.2., Secondary Distribution System
Training References:	• CD-ROM, 3E0X1-26.2.2.6.2, Harvest Falcon Electrical Distribution System • AFI 32-1064, Electrical Safe Practices • AFPAM 10-219, Vol. 5 • T0 00-105A-12 • TO 35CA1-2-6-1
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hot Stick • Rubber Gloves • Multi Meter • High Voltage Tester • Megger • Phase rotation meter • Work Gloves • Hand Tools
Learning Objective:	• The trainee will know the steps required to safely Install, Maintain and Troubleshoot a Bare Base Secondary distribution system.
Samples of Behavior:	• Trainee will be able to name the safety equipment required to Install, Maintain, and Troubleshoot a Bare Base Electric Secondary Distribution Center (SDC) System. • Trainee will know the required steps to Install, Maintain, and Troubleshoot a Bare Base Electric Distribution System.
Notes:	
• To successfully complete this element, the steps must be followed exactly—no exceptions. • Any safety violation is an automatic failure.	

SECONDARY DISTRIBUTION SYSTEM

Background: The Bare Base Electrical Distribution System is comprised of MEP 12 power generators rated at 75O kw with an output of 2400/ 4160. Power Distribution Centers (PDC) which provide switching control of up to 6 primary circuits distributed through out the base. And the Secondary Distribution Centers that step down the 4160V to 120/208V to supply power to tents, buildings, and equipment. You may be required to set up a bare base electrical distribution system at any time or any place in the world. The purposes may range from natural disasters, such as Hurricane Andrew at Homestead AFB, Fla. to military operation activities such as Desert Shield/Desert Storm. You should become familiar with the bare base electrical distribution system

When you deploy to a Bare Base location you will be working with, or near, such items as mechanical equipment, electrical equipment, liquid and compressed gases, acids, and possibly even radioactive materials. Take the necessary time to personally learn as much as you possibly can about the equipment around you. Air Force manuals, pamphlets, technical orders, and commercial texts are available from which to learn this material.

Almost everyone is required to work on or around electrical circuits as they do their job in the Air Force. You cannot see electricity, therefore, you cannot determine by looking at a conductor if it is energized by voltage. Also, you cannot determine the amount of voltage applied to the conductor.

- ***To accomplish this lesson, complete:*** **AFQTP, CD-ROM, 3E0X1-26.2.2.6, Harvest Falcon Electrical Distribution System**

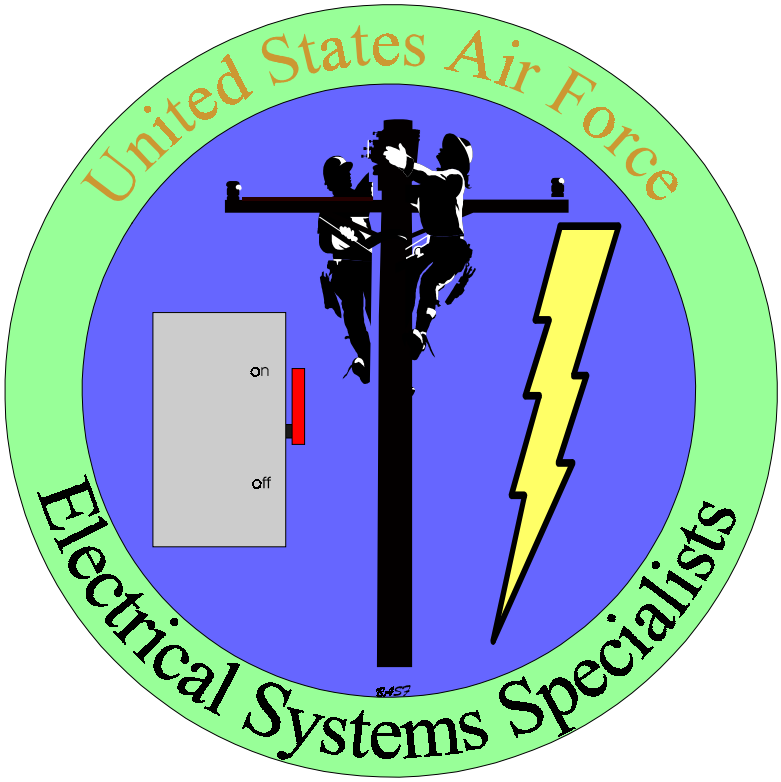
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8044	**Harvest Falcon Electrical Distribution System**

DISTRIBUTION SYSTEM

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee properly explain the installation procedure for a SDC?		
2. Did trainee explain the operating principles of the SDC?		
3. Did an trainee explain the process of isolating the SDC under normal conditions?		
4. Did an trainee explain the process of isolating a SDC output circuit in an emergency situation, under load?		
5. Did trainee identify basic layout of the SDC?		
6. Did trainee list basic components of the SDC and explain their function?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

MODULE 26 **AFQTP UNIT 2**

GROUNDING (26.2.2.6.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

GROUNDING
Task Training Guide

STS Reference Number/Title:	26.2.2.6.3., Grounding
Training References:	• CD-ROM, 3E0X1-26.2.2.6., Harvest Falcon Electrical Distribution System • AFPAM 10-219, Vol. 5 • TO 35C6-9-1 • CDC 3E0X1B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Hand Tools • Ground rods • Sledge hammer
Learning Objective:	• The trainee will know the appropriate grounding methods of the Bare base electrical distribution system.
Samples of Behavior:	• Trainee will be able to identify the various types grounding methods for the Bare base electrical distribution system. • Trainee will know the required steps to ground the Bare base electrical distribution system.
Notes:	
• To successfully complete this element, the trainee must be able to identify proper procedures to ground the Bare base electrical distribution system. • Any major discrepancy constitutes failure.	

GROUNDING

Background: In any electric power generation and distribution system, appropriate electrical grounding of equipment such as generator sets, transformers, junction boxes, and bus bars is generally very important to insure safe and reliable operation of the system. Traditional guidance requires 25 ohms resistance to ground, or less, at all normally grounded locations. However, the nature of the soils in many locations will not permit this level of assured grounding with traditional ground rods or expedient techniques. In especially dry, rocky, or sandy regions, 25 ohm or less grounding to earth can only be obtained using more involved and equipment-intensive methods that may not be available to bare base engineers.

- ***To accomplish this lesson, complete:*** **AFQTP, CD-ROM, 3E0X1-26.2.2.6, Harvest Falcon Electrical Distribution System**

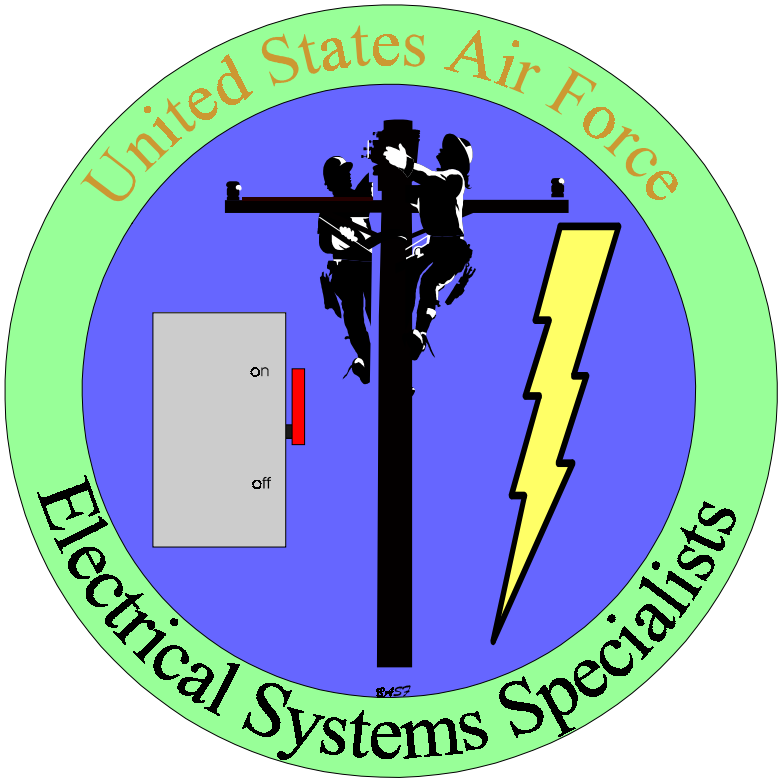
NOTE: In the CD-ROM there are tests after each lesson. After completion of **all** the lessons see your Unit Education and Training Manager to take the following **mandatory** Certest:

Test no.	**Title**
8044	**Harvest Falcon Electrical Distribution System**

GROUNDING

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee identify all the equipment needed for the job?		
2. Did trainee explain the four different limited time and types of grounding methods for the Bare base electrical distribution system?		
3. Did the trainee comprehend why expedient grounding methods are used for short term use?		
4. Does the trainee know the goal of grounding protection in the Bare base electrical distribution system 25 ohms or less?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



HARVEST FALCON ASSETS
TEMPER TENT

MODULE 26 **AFQTP UNIT 2**

INSTALL TENT LIGHTING (26.2.2.7.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

INSTALL TENT LIGHTING
Task Training Guide

STS Reference Number/Title:	26.2.2.7.3. Install tent lighting
Training References:	• AFQTP Video PIN 613769 TEMPER Tent Electrical System Installation • AFPAM 10-219, Vol. 5 • T.O. 35E5-6-1 • • AFH 10-222, Vol. 1 - Bare Base Development • AFH 10-222, Vol. 6 - Tent Erection • CDC 3E051B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electrical hand tools • Electrical meters
Learning Objective:	• The trainee should understand the purpose of tent lighting.Trainee should be able to determine lighting requirement for TEMPER tents.
Samples of Behavior:	• Trainee will have an understanding of what type of support is required • Trainee will understand the purpose of tent lighting • Trainee will be able to determine lighting requirement for tents • Trainee will have a strong understanding of the installation procedures for TEMPER tent lighting • Know safety requirements associated with installing tent lighting
Notes:	
• All safety practices should be followed. • Any safety violation is an automatic failure.	

INSTALL TENT LIGHTING

Background: Temper tent lighting comes in kits that contain four fluorescent style light tubes, light tube suspension cords, two spare light bulbs, all in a hardened, impact resistant case. The number of light kits needed for the tent city or any one tent will depend on the needs of the tents. These lights are very versatile and will meet any needs from offices to machine shops, to include sleeping quarters. These lights can be connected to any 120 volt power source. The light fixture is suspended from the frame of the tent and may be mounted to suit the needs of the individual. They may be strung across the tent or parallel with the center beam. The lights have a 120-volt male plug on one end and a 120-volt receptacle on the other end. Both cords are weatherproof and two feet long. The lights are fed through and can be daisy chained to form one light circuit. The lights can be turned on or off by the individual switch on each light unit or from one main switch on the feeding panel.

***To Perform These Tasks complete*: Video, PIN #613769, TEMPER Tent Electrical Installation**

Note: The Power supply normally used to feed the Electrical Distribution Box (EDB), for fluorescent lighting, is the Secondary Distribution Center (SDC). This is due to the EDB being configured for the cannon plug on the 60 amp cable normally fed from the SDC. This is for medium power consumption areas like the hospitals. However, there are some A-panels and Power Distribution Panels (PDPs) that are equipped to handle the load and cannon plug.

Review Questions
for
Install Tent Lighting

Question	Answer
1. What is the voltage needed for tent lighting?	a. 208 volts b. 120 volts c. 240 volts d. 277 volts
2. The lights have to be connected to a separate power source for each light.	a. True b. False
3. If a single light is out the cause could be?	a. Blown fuse b. The light's switch c. Loose connection d. All the above
4. The suspension strap is hung from?	a. The ridge pole b. The tent liner c. The tent frame d. The AC duct
5. If you turn off a single light in a circuit all the lights behind that light will go out also.	a. True b. False

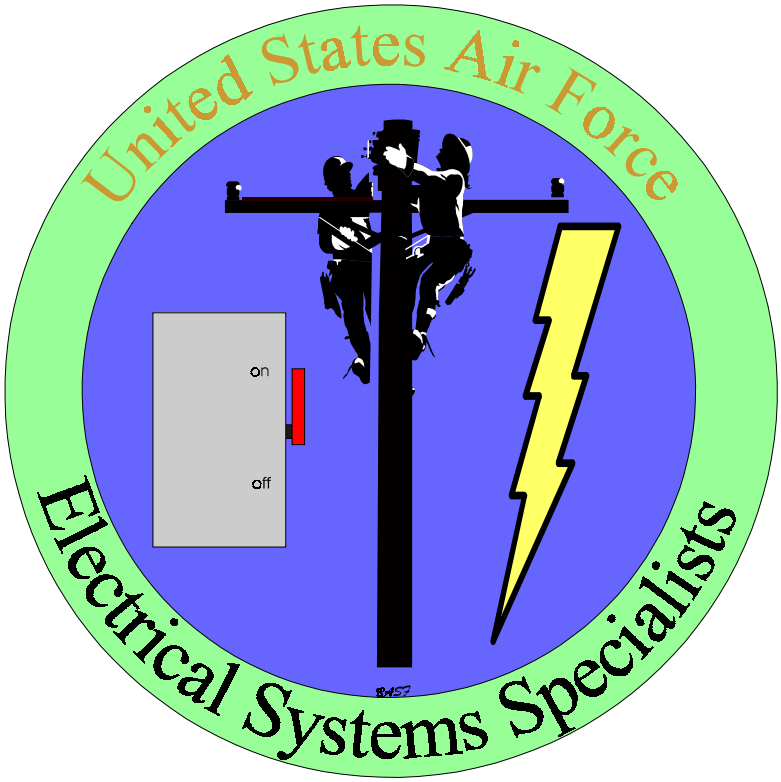
After completion of this lesson, you may see your Unit Education and Training Manager to take the following optional Certest:

Test no.	**Title**
8100	**Temper Tent Lighting**

INSTALL TENT LIGHTING

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee identify all the equipment needed for the job?		
2. Did trainee explain the process of installing temper tent lighting circuits?		
3. Did the trainee comprehend the use and application of the tent lighting kit?		
4. Did the trainee install tent lighting using supplied kit?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



EXPEDIENT BEDDOWN METHODS

MODULE 26 **AFQTP UNIT 2**

MEDICAL FACILITIES ELECTRICAL SUPPORT (26.2.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

MEDICAL FACILITIES ELECTRICAL SUPPORT
Task Training Guide

STS Reference Number/Title:	26.2.3., Medical facilities electrical support
Training References:	• AFPAM 10-219, Vol. 5, Chapter 11 • CDC 3E051B, Vol. 4
Prerequisites:	• Possess as a minimum a 3E031 AFSC
Equipment/Tools Required:	• Electrical hand tools • Rubber protective equipment • Electrical meters
Learning Objective:	• The trainee should understand the requirement CE has in supporting medical facilities • Trainee should be able to determine electrical requirement for different medical facilities.
Samples of Behavior:	• Trainee will have an understanding of what type of support is required. • Trainee will have a strong understanding of electrical requirements for medical facilities.
Notes:	
• All safety practices should be followed. • Any safety violation is an automatic failure.	

MEDICAL FACILITIES ELECTRICAL SUPPORT

Background: Air Force medical doctrine restricts medical staff from performing any task other than those specifically related to the medical field. Therefore it is your responsibility to provide electrical support for the medical facilities. We will discuss the electrical support needed for the air transportable clinic, air transportable hospital, contingency hospital, aeromedical staging facility, and the transportable blood transshipment center.

To perform these tasks, follow these steps:

Step 1: Air transportable clinic (ATC).

- The ATC provides limited outpatient clinic and short-term care.
- Normally, initial bare-base medical support is furnished by an ATC.
- Advanced cardiac life support, limited laboratory, and limited patient-holding capability may be available.
- It also provides outpatient clinic services for approximately 300–500 personnel and may have a limited patient-holding capacity (6 cots).
- The clinic must be made operational within 24 hours of its arrival at the deployment site.
- Normally, the ATC is collocated with other medical facilities.
- Staffing consists of one physician and three medical technicians.
- These personnel appear on the mobility roster of the flying squadron they support.

Step 2: ATC facility shelters, components, equipment.

- The ATC may be housed in three 8-foot by 20-foot Tent Extendible Modular Personnel (TEMPER) tent sections, or in one general purpose medium (GPM) tent.
- It requires a power source that is capable of providing 10–15 kW.
- The equipment set includes: Hunter 60,000-BTU heater, interior lights and electrical outlets, refrigerator, cardiac monitor, portable autoclave, and possibly one ambulance.
- (Figure, 1) Shows the ATC layout.

NOTE:
The number of personnel assigned to the ATC is insufficient to erect the TEMPER tent on their own. Assistance must be provided by either the flying squadron or civil engineering.

Step 3: Air transportable hospital (ATH).

- The 50-bed ATH provides primarily second-echelon-level care with limited surgical capability (third-echelon-level care).
- The ATH provides triage, casualty handling, resuscitative surgery, stabilization, medical and dental care, preparation for evacuation of casualties, and a limited capability to treat chemical warfare contaminated patients.
- The ATH is staffed by 128 personnel.

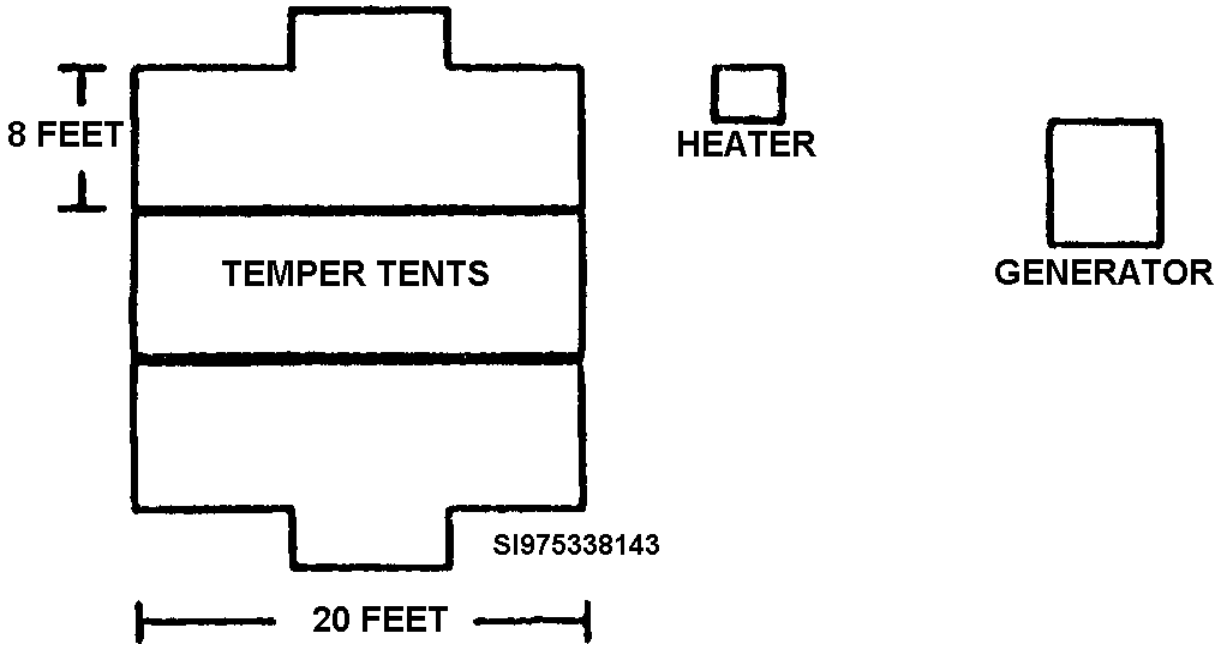


Figure 1, The ATC layout.

- The ATH utilizes 70 TEMPER tent sections and 3 international standardization organization (ISO) shelters.
- All medical functions are housed in TEMPER tents, except for surgery, x-ray, and laboratory.
- The latter functions use ISO shelters.
- Since the ATH is designed in a modular or incremental fashion, a quick response subset can be transported in one to two C–141 aircraft.
- The initial increment of the 50-bed ATH is termed “Coronet Bandage.”
- Coronet Bandage can handle limited acute trauma and minor surgery while awaiting arrival of aeromedical evacuation, the remainder of the ATH, or both. Initial supplies deployed with Coronet Bandage permit about 5 to 10 days of operation, depending upon the number and type of casualties encountered.
- The Coronet Bandage has 14 beds to provide minimal inpatient care.
- The remainder of the ATH is palletized so that a second increment can be deployed and erected adjacent to the first increment.
- When this intermediate increment is in place, the ATH has 25 beds, provides full surgical stabilization, and has supplies for an additional 10 days.
- The final ATH increment deploys a 25-bed ward and the remainder of the personnel and supplies.
- For peacetime training exercises, only the Coronet Bandage 25-bed intermediate ATH is deployed.

NOTE:
Some ATHs destined for SWA deployment are designed to operate for 60 days without resupply support (medications, medical equipment and supplies to perform medical operations).

Step 4: ATH facility shelters, components, and equipment.

- The ATH deploys with the tools needed for erection, two MEP–7 portable 100-kW generators (for initial and backup power), a 400-gallon water trailer, and heating and air-conditioning units.
- PVC pipes, hoses, and clamps permit utility connection to the bare-base water distribution and liquid waste disposal systems.
- Once operational, the ATH requires a power supply that is capable of providing 170 KW.
- (Figure, 2) contains the current design for the 50-bed ATH.

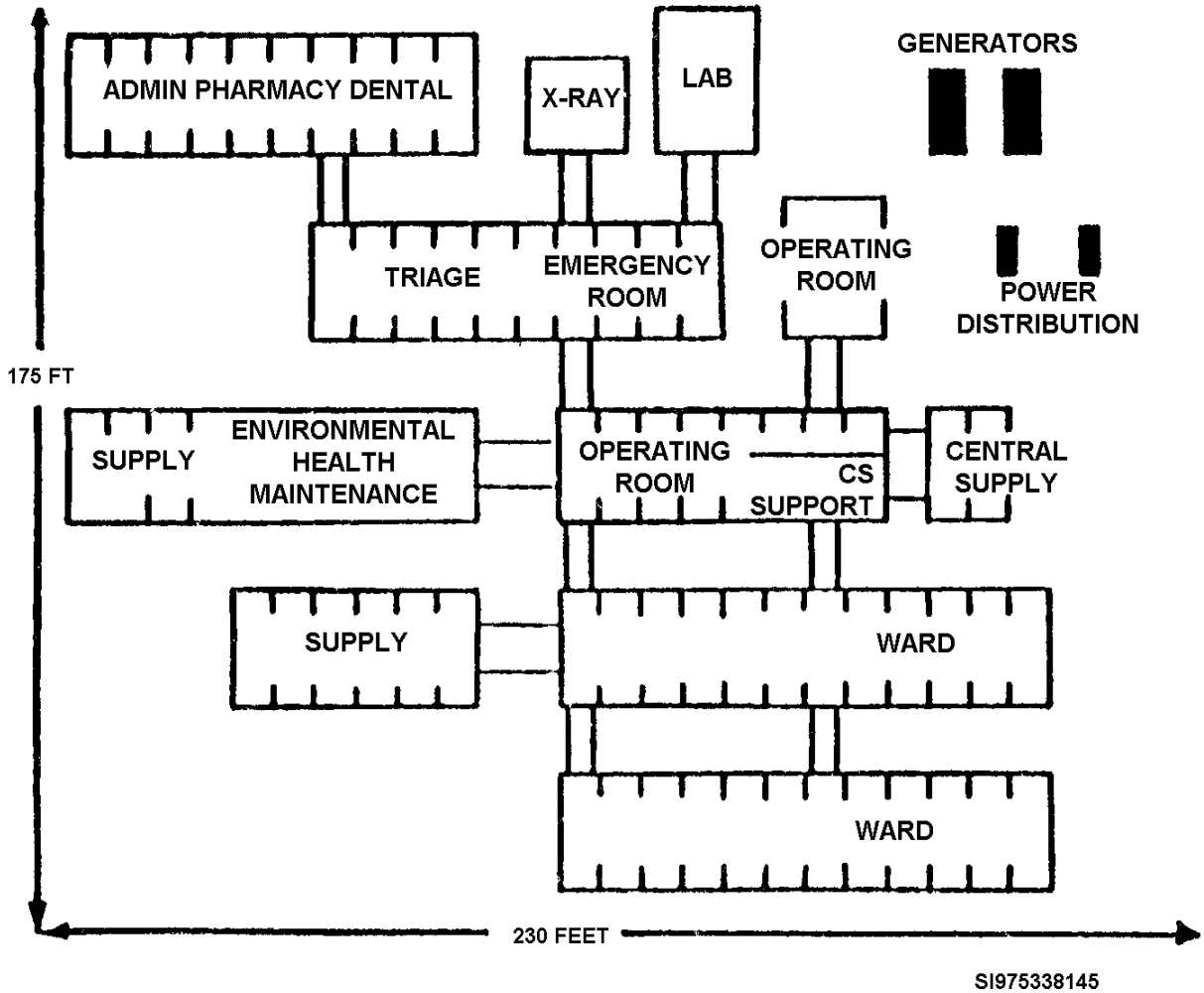


Figure 2, The current design for the 50-bed ATH.

Step 5: Contingency hospital (CH).

- The 250-bed CH is a field medical assemblage that is designed to provide second- through third-echelon care.
- It is equipped to furnish definitive medical, dental and surgical care for patients who are expected to return to duty within 15 days and also to provide stabilization for further evacuation for those patients who will not return to duty within the theater.
- Designed in modular fashion, the CH can be deployed incrementally.
- The initial subset provides limited acute trauma life support and minor surgery capability pending arrival of either aeromedical evacuation, the remainder of the 250-bed CH, or the collocation of an ATH.
- When the entire CH is in place (erected onto the first increment), it can operate for 60 days without resupply (except blood) depending upon the type of casualties treated
- The CH facility layout is shown in (Figure, 3).

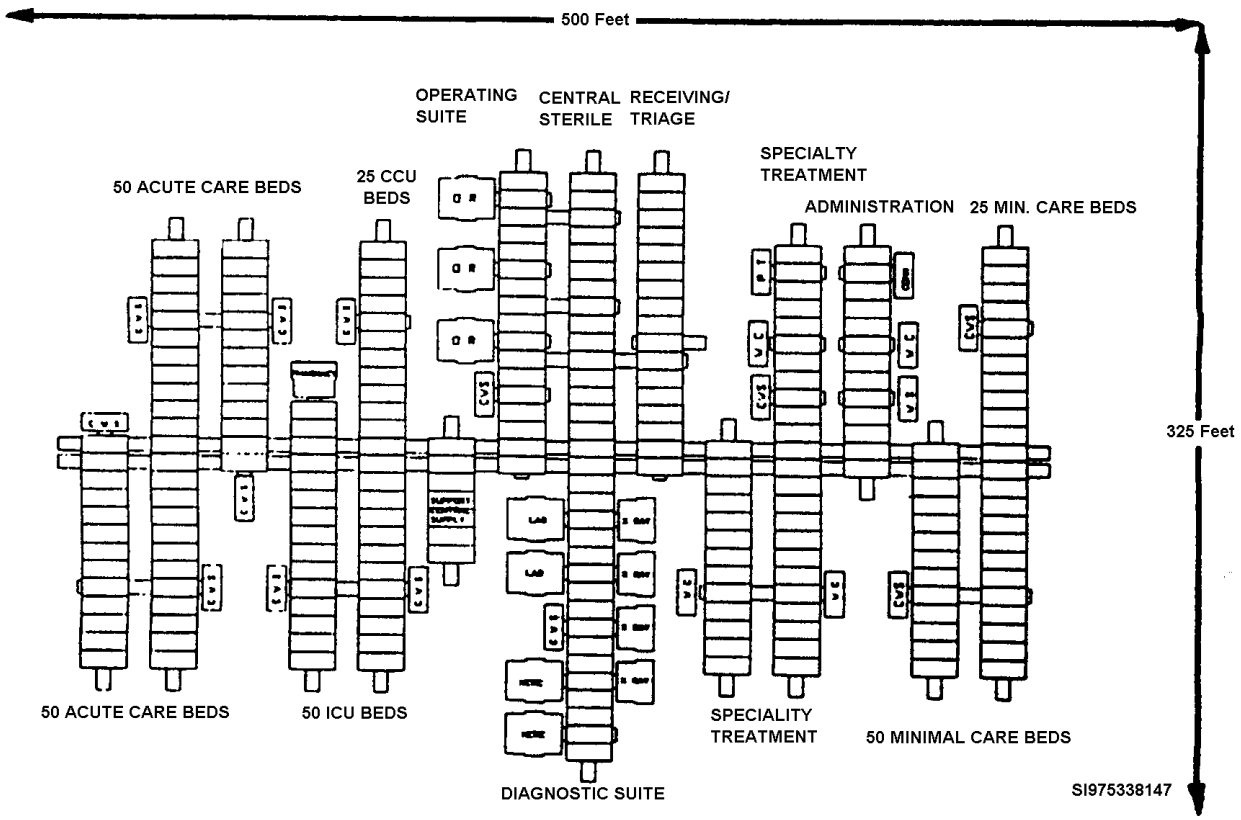


Figure 3, CH facility layout.

Step 6: CH facility shelters, components, and equipment.

- The CH uses 250 TEMPER tent sections, 31 ISO shelters, and a new (9–1) Harvest Eagle kitchen.
- A medical logistics warehouse is also on or near the CH complex.
- Tools needed for erection and portable 100-kW generators (for initial and backup power) are deployed with the CH.

- Once operational, the CH requires a power source that is capable of delivering 1,300 kw, the largest of all deployable modes.
- Six ambulances and three buses provide transportation for patients.

NOTE:
The CH must be sited near a base support complex.

Step 7: Aeromedical staging facility (ASF).

- An ASF is the aeromedical evacuation interface between third- and fourth-level medical care.
- Injured personnel who have been treated at an ATH, CH, or equal medical treatment facility transit the ASF in 24 hours.
- The ASF is staffed by approximately 135 personnel.
- The ASF can be erected into a fully operational status within 24 to 72 hours in most climates.
- It is designed in a modular fashion and deployed in increments.
- The initial increment, termed "coronet early return," is capable of operating in this mode for 7 to 14 days (depending on casualty load).
- When the remaining increments are in place, the ASF has up to 250 beds, 4 ambulance, and supplies for 60 days of operation.
- Under normal conditions, the ASF is capable of receiving 250 casualties in a 24-hour period.
- Normally, casualties are evacuated within 24 hours after entry into the ASF.

Step 8: ASF Facility shelters, components, equipment.

- The ASF uses 168 TEMPER tent sections.
- Tools needed for erection, portable 100-kw generators (for initial and backup power), and environmental control systems are deployed with the ASF increments.
- When operational, the power supply must be capable of delivering 200 kw.

Step 9: Transportable blood transshipment center (TBTC).

- Each TBTC is capable of holding up to 2 pallets or about 6,000 units of blood (a pallet is defined as 122 insulated blood containers).
- The TBTC occupies eight TEMPER tent sections and is normally collocated with the 250-bed CH or other supporting medical treatment facility located near a strategic air head.
- Support requirements consist of technical assistance (and physical assistance, if TBTC staffing is inadequate) for shelter erection and the provision of approximately 800 pounds of wet ice per day for cooling of blood containers.
- No other additive requirements have been identified since TBTCs are collocated with other medical facilities.
- The power requirements are determined by the medical facility with which it is collocated.

Review Questions
for
Medical Facilities Electrical Support

Question	Answer
1. How much time do you have to get the ATC operational?	a. 24 hours. b. 48 hours. c. Two days. d. One day.
2. What are the power requirements for the ATC?	a. 10-15 KW. b. 30 KW. c. 170 KW. d. None.
3. Two MEP-7 generators are deployed with the ATH to provide initial and backup power.	a. True. b. False.
4. The ATH requires a 170 kw power supply.	a. True. b. False.
5. The operational power requirements for the CH are 1300 KW.	a. True. b. False.
6. The CH requires the largest power source of all deployable hospital facilities.	a. True. b. False.
7. The ASF can be erected and into a fully operational status within _____.	a. 12 to 24 hours. b. 24 to 72 hours. c. 24 to 36 hours. d. 12 to 36 hours.
8. Some ATHs destined for SWA deployment are designed to operate for _____ days without resupply support.	a. 20. b. 30. c. 40. d. 60.

After completion of this lesson, see your Unit Education and Training Manager to take the following **mandatory** certest:

Test no.	**Title**
8122	**Medical Facilities Electrical Support**

MEDICAL FACILITIES ELECTRICAL SUPPORT

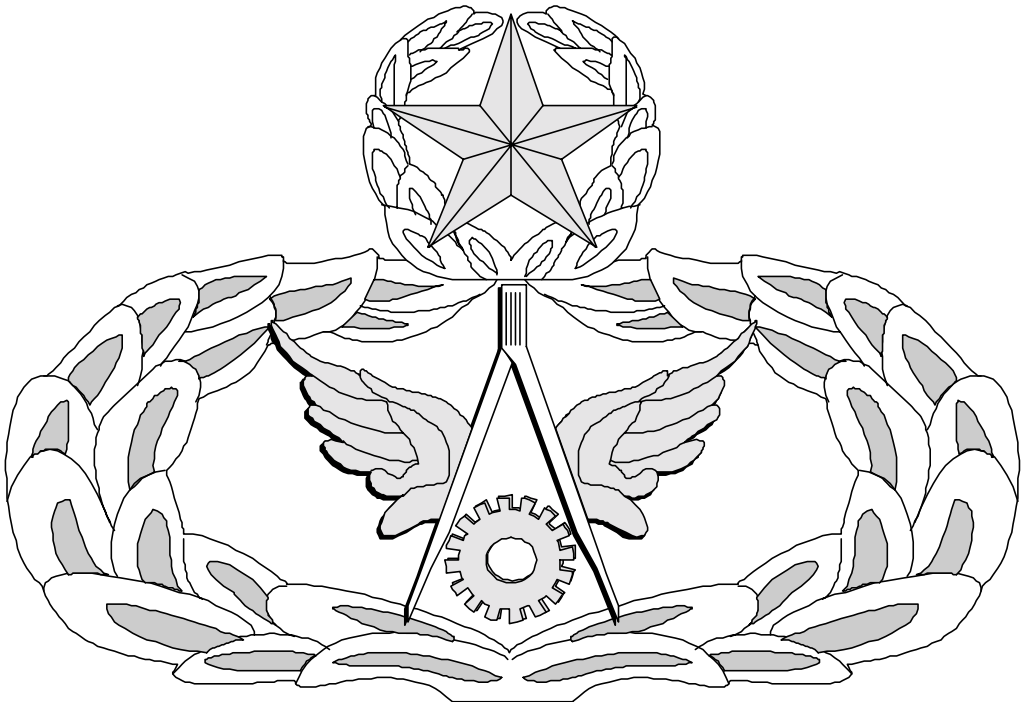
Performance Checklist		
Step	**Yes**	**No**
1. Does trainee understand the importance of electrical support?		
2. Does trainee know the power requirements for the different electrical facilities?		
3. Does trainee know the difference between the initial, emergency, and operational load requirements for the medical facilities?		
4. Does trainee know the time allowed to get the ATC operational?		
5. Does trainee know the time required to get the ASF erected?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



For

ELECTRICAL SYSTEMS

(3E0X1)

MODULE 26
AFSC SPECIFIC CONTINGENCY RESPONSIBILITIES

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)
(3EOX1-26.1.1.2.1, 26.1.1.2.2, 26.1.1.2.3)

Test questions for these core items are included in the CDROM.

ELECTRICAL SYSTEMS EXPEDIENT REPAIR AND CANNIBALIZATION TECHNIQUES
(3E0X1-26.1.2.2)

Question	Answer
1. Cannibalization is a method used to restore identical or similar systems, by robbing parts from some damaged units to repair others.	a. True
2. The first action is the isolation of damaged areas that present life-threatening hazards to personnel, or poses the potential for additional property damage.	a. True
3. The basic safety rule/s that apply/applies when working on any electrical system?	d. Both a and b
4. Holes and cracks in transformer tanks can be repaired or patched by welding.	a. True
5. The two transformers used in the open-delta connection will supply what percent of their rated capacity?	b. 86.6
6. When making repairs to interior wiring, what is used to the maximum extent possible?	d. All of the above.
7. When are overhead power lines and associated utility poles likely to suffer extensive damage?	d. All of the above.
8. What type of oil does a transformer require?	a. Highly refined mineral oil.
9. In bypassing damaged areas or in running temporary lines into a structure, wiring can be run across floors and other building surfaces to expedite repairs.	a. True
10. Expedient repairs are generally considered complete when major damage has been eliminated and most systems are capable of performing their basic function.	a. True

INSTALLATION

(3E0X1-26.2.1.1.1)

Question	Answer
1. What is the total kw rating of the generators that supply power to a module group?	b. 120 kw
2. Total cable distances from the generator to the point of use should not exceed what length?	d. 800 ft
3. Increasing the voltage at the generator remedies the _____ at the tent.	c. Voltage drop
4. Which of the following IS NOT a major component of the tent lighting and power distribution?	c. Two 60 kw generators

REMOVAL

(3E0X1-26.2.1.1.2.)

Question	Answer
1. What is the first step in removing tent lighting?	d. Disconnect power
2. What is the final step for tent light removal?	c. Replace all components to proper place

INSTALLATION

(3E0X1-26.2.2.1.1.)

Question	Answer
1. What does the term RALS stand for?	a. Remote Area Lighting System
2. What is the power requirement for the RALS?	b. 120 / 208 VAC
3. How long is one lighting loop assembly?	d. 750 ft
4. What is the spacing of the junction boxes along the lighting loop assemblies?	b. 125 ft

OPERATION
(3E0X1-26.2.2.1.2)

Question	Answer
1. What turns the RALS lights on during normal operation?	b. Photo Cell
2. What position should the OVERRIDE SWITCH be in during normal operation?	c. AUTO
3. What type of lamp does the RALS use?	c. 150-watt, PAR 38, mercury vapor

MAINTENANCE
(3E0X1-26.2.2.1.3.)

Question	Answer
1. How often should RALS structure be inspected?	c. Semiannually
2. Circuit Breakers should be inspected _____.	b. Quarterly
3. Which RALS components are checked for corrosion and broken items?	d. All of the above
4. If any corrosion is found on the RALS structure, remove it with sandpaper and repaint the affected area.	a. True

POWER SUPPLY INSTALLATION
(3E0X1-26.2.2.3.1)

Question	Answer
1. What are the power requirements for the field laundry unit?	b. 120/208 VAC 3, phase 60 amps.
2. How can you check the phase rotation if a phase rotation meter is not available?	c. By observing the rotation if the motor on the water pump.
3. What precaution must you take when you make the platform interconnections?	c. Not to cross the connections.
4. How many ground rods are used when the unit is in operation?	d. 8

POWER SUPPY INSTALLATION
(3E0X1-26.2.2.4.1)

Question	Answer
1. What is the voltage requirement for the Harvest Falcon kitchen facility?	b. 120 / 208 VAC
2. What piece of equipment is used to distribute voltage to the entire Harvest Falcon kitchen facility?	c. Secondary distribution center
3. What is/are used to supply power to the Harvest Eagle kitchen?	a. One 60 and one 30-kWgenerators.
4. In order to protect power cables they are buried or a platform is placed over them to prevent people from walking on them.	a. True
5. The total rating of the two generators needed to power the Harvest Eagle kitchen is _____.	a. 90
6. What major component of the Harvest Eagle kitchen electrical system, not only acts as a distribution point, but also provides circuit protection?	a. Primary distribution box
7. What is the amp rating of the cable going from the SDC to the appliances?	b. 60 amp cable
8. How many circuits feed the walk-in refrigeration units in the Harvest Eagle kitchen?	c. 4

MAINTENANCE
(3E0X1-26.2.2.4.2.)

Question	Answer
1. How often is the Harvest/Eagle kitchen inspected while in operation?	b. Weekly
2. When inspecting light assemblies you are checking for _____.	d. All of the above
3. Harvest Falcon/Eagle kitchens are inspected prior to installation, weekly while in operation, and prior to disassembly.	a. True

INSTALL TENT LIGHTING
(3E0X1-26.2.2.7.3)

Question	Answer
1. What is the voltage needed for tent lighting?	b. 120 volts
2. The lights have to be connected to a separate power source for each light.	b. False.
3. If a single light is out the cause could be?	All the above.
4. The suspension strap is hung from?	c. The tent frame.
5. If you turn off a single light in a circuit all the lights behind that light will go out also.	b. False.

MEDICAL FACILITIES ELECTRICAL SUPPORT
(3E0X1-26.2.3)

Question	Answer
1. How much time do you have to get the ATC operational?	a. 24 hours.
2. What are the power requirements for the ATC?	a. 10-15 kW
3. Two MEP-7 generators are deployed with the ATH to provide initial and backup power.	a. True
4. The ATH requires a 170 KW power supply.	a. True
5. The operational power requirements for the CH are 1300 KW.	a. True
6. The CH requires the largest power source of all deployable hospital facilities.	a. True
7. The ASF can be erected and into a fully operational status within_____.	b. 24 to 72 hours
8. Some ATHs destined for SWA deployment are designed to operate for _____ days without resupply support.	d. 60